

REHABILITATION OF AGRICULTURE

IN

BOUGAINVILLE



PACONSULT PTY LTD

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ABBREVIATIONS and ACRONYMS

ADRA	Adventist Development Relief Agency
AusAID	Australian Agency for International Development
ASL	Above Sea Level
BCL	Bougainville Copper Ltd
BCW	Bougainville Council of Women
BPC	Bougainville Peoples Congress
BRA	Bougainville Revolutionary Army
BTG	Bougainville Transitional Government
CCEA	Cocoa and Coconut Extension Agency
CoE	Council of Elders
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CCRI	Cocoa and Coconut Research Institute
DAL	Department of Agriculture and Livestock
DEO	District Extension Officer
DFI	Development Financial Institution
DPI	Division of Primary Industry
EU	European Union
FEO	Field Extension Officer
FMO	Framework of Mutual Obligations
NAQIA	National Agricultural Quarantine Inspection Authority
NARI	National Agricultural Research Institute
NGO	Non-Government Organisation
NZ	New Zealand
NZODA	New Zealand Overseas Development Agency
NZVA	New Zealand Volunteers Abroad
OBA	Office of Bougainville Affairs
OECF	Overseas Economic Cooperation Fund (of Japan)
PIP	Public Investment Programme
PNG	Papua New Guinea
PNGBC	Papua New Guinea Banking Corporation
PNGRIS	Papua New Guinea Resource Information System
RDB	Rural Development Bank
STC	Specialised Training Centres
TA	Technical Advisor
UNDP	United Nations Development Programme
UNOPS	United Nations Office of Project Services
USAID	United States AID
VEO	Village Extension Officer

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EXECUTIVE SUMMARY

The island of Bougainville has been in a state of virtual civil war between the years of 1989 and 1998 when a ceasefire was eventually signed. During that time agricultural production and economic activity on the main island, both private and public, came to a halt and infrastructure has been allowed to collapse. The European Union (EU) has been involved in trying to resurrect agriculture and the economy since 1985. It appointed a Technical Advisor in 1996 who has been working with the Department of Bougainville and other agencies to get agriculture going again.

The main thrust of the EU assistance so far has been on Buka island where it has been assisting the Cocoa and Coconut Research Institute (CCRI) and Cocoa and Coconut Extension Agency (CCEA) distribute cocoa planting materials, start trials for a new sun drier and restore the feeder road system. It has allocated a further 5 million Euros (approx. K13 million) for further agricultural development on the main island. This study is the result of a rapid rural appraisal carried out between 13-22 July 1999. It followed project proposals prepared by the Technical Advisor which proposed the following projects:

- An agricultural rehabilitation project which included cash crops, alternative crops, food production and livestock;
- Restoration of feeder roads on the main island;
- Vocational and technical training tailored to the specific needs of post-crisis Bougainville; and
- Provision of credit.

Paconsult proposed to the Stabex Steering Committee that the study should proceed in two phases, a rapid rural appraisal to identify areas for a specific project design followed by detailed design. This was based on the supposition that it would be a very expensive exercise to prepare a project document for the whole island and that the amount of money the EU wanted to spend would not be enough to carry out the project throughout Bougainville. Based on farming population and land suitability this report recommends that the EU concentrate on four districts, **Arawa/Central, Wakunai, Buin and Siwai**. It also supports the extension of the micro credit scheme which has been the subject of a separate study and a number of smaller, immediate interventions.

Paconsult strongly recommends that the EU appoint a new Technical Advisor and a Project Implementation Unit as soon as possible. Other aid agencies such as AusAID and the UNDP are waiting for the EU to assume the lead role in agriculture and there is a need for all assistance to be closely co-ordinated and integrated into short and long term provincial planning. It is therefore important that the new Advisor be attached to a senior officer in the department of Bougainville, preferably the administrator. We do not see the need for a large implementation unit and recommend the use of fly-in/fly-out experts to assist in the monitoring of the project if there is not sufficient staff available in the delegation itself.

Immediate Interventions

We recommend the following immediate interventions

- Appointment of a new technical advisor (steps have already been taken to do this).
- Arrange purchase and delivery of tractors and trailers to Kunua, Torokina, Mamagota and Marau.
- Carry out urgent repairs to bridge at Torokina and causeway at Kunua.
- Implement Project 1.6E Bougainville Port Infrastructure Project.
- Provide hand rice mills to all districts except the atolls and obtain new, improved rice seed for distribution to interested farmers.

Additional Interventions

- Ensure that all agricultural interventions are properly co-ordinated and agreed to by the Department of Bougainville. Get commitment for the Department of Bougainville that the project will be continued after the EU intervention comes to an end.
- Commission detailed design proposal for the integrated development of cocoa and coconuts, feeder roads and training/extension needs in the Wakunai, Arawa/Central, Buin and Siwai districts.
- Make provision for credit for farmers who wish to plant more than 1 hectare of cocoa or coconuts.
- Design appropriate training courses for CCEA staff who will work on the project.

1. INTRODUCTION

1.1 In late 1989 and early 1990 agriculture in Bougainville virtually came to a standstill as a result of the political and military crisis. Since that time there has been virtually¹ no upkeep of trees, no maintenance of roads, wharves or airstrips, and wholesale destruction of infrastructure of an economic and civil nature. Subsistence agriculture was also affected by the placing of most of the population in care centres

1.2 Since 1993 the Government has been trying to re-establish itself and restore economic activity in the province. The creation of the Bougainville Transitional Government (BTG) was a first step in this direction, however fighting flared up again and it was not until the Lincoln Agreement signed in New Zealand in 1998 that there was a return to peace in most of Bougainville. There is still an area of Central Bougainville around the old Panguna mine controlled by rebel leader Francis Ona which is described as a "no go" area and which outsiders are forbidden to enter.

1.3 The pre crisis economy of Bougainville revolved around two sources, the giant Bougainville Copper Limited (BCL) mine and agriculture. The main crops produced were cocoa and copra in both smallholder and plantation modes. However the province also produced vegetables for the formal BCL market and the informal urban markets as well as for sale to plantation workers. It had one of the finest piggeries in the region, it was virtually self sufficient in poultry and eggs, produced large quantities of marine products and was renowned for its betel nut.

1.4 In 1995 the European Union commissioned *Paconsult Ltd* to make a report on the Restoration of Agriculture in Bougainville². This report recommended the following immediate steps to be taken:

- Appointment of an overall co-ordinator
- Purchase of a barge to transport produce out of, and trade goods into, Bougainvillean ports on the main island
- Restoration of feeder roads
- Introduction of a micro credit scheme

1.5 The report was accepted by the Bougainville Restoration Authority, the recommendations adopted and the co-ordinator was appointed after some delay in Port Moresby. The barge project was also delayed for several years and has now been abandoned on the basis that there are enough commercial vessels serving Bougainville. The barge project has been replaced by a wharf and infrastructure project which will build storage sheds and access roads at selected shipping points. Feeder road restoration has been completed on Buka island at a cost of K1.2 million but has not yet commenced on the main Bougainville island because of problems in obtaining Stabex funding which have been latterly caused by international litigation in Brussels, Belgium.

¹ In some areas like Tonu there has been some repairs and maintenance done to both roads, fermenteries and crops, it has been stated that all feeder roads in 4 out of 9 communities have been repaired, the other 5 are still under the influence of the BRA.

² M. Manning; *Restoration of Agriculture in Bougainville*; (Paconsult, Port Moresby), 1995

1.6 Projects which have already been funded by the European Union in Bougainville under the Stabex facility are:

- NSP Restoration Programme-repayment of debt, rehabilitation of research station and nurseries in Buka, Total K1, 100, 000 (completed).
- Bougainville Restoration study K17, 000 (completed).
- Bougainville Women's Micro Credit Scheme, K100, 000 (completed).
- Rural Feeder Roads Improvement Programme/Buka Island, K1, 200, 000 (not yet completed as a variation has been approved to increase the scope of the project)
- Cocoa and Coconut Census Project, K44, 000 (not yet completed, awaiting results).

1.7 This study is a follow up of proposals prepared by the European Union Technical Assistance Advisor (the co-ordinator) to Bougainville, Mr. Trevor Clarke, which proposed the following projects:

- An agricultural rehabilitation project which included cash crops as well as alternative crops, food production and livestock;
- Restoration and maintenance of feeder roads on Bougainville main island;
- Vocational and technical training tailored to the specific needs of post crisis Bougainville;
- Provision of credit;

1.8 The study arose from specific project documents to implement these proposals. After some discussion it was agreed that there needed to be a more integrated approach to the project because of the limited funding available from Stabex sources, 5 million Euros (approx. K13m.). The terms of reference are shown as Appendix 1. During the course of the study close liaison with the Office of Bougainville Affairs (OBA), the Department of Bougainville, the Stabex Co-ordinating Committee and the European Union has been maintained.

1.9 The study recognises two important aspects of post crisis Bougainville. The overwhelming majority of people do not want handouts or special assistance other than to be able to return to normality and earn their own livings. The second one is that the crisis has lasted for ten years and has spawned almost a generation of children and youths who have no education and have not participated in traditional agricultural activities because they were confined to care centres or were actual combatants in the conflict.

1.10 The study commenced in July and a visit was made to Bougainville between 13 -22 July when all major centres were visited except Nissan and the atolls. The itinerary is shown as Appendix 2 and a list of people consulted is shown as Appendix 3.

1.11 The team consisted of Michael Manning, Economist and Team Leader, David Freyne, Agricultural and Land Use expert, Iain Stevenson, Infrastructure and Feeder road expert, and Trevor Clarke, EU Technical Advisor to Bougainville.

2. THE STUDY

2.1 This study is the result of a Rapid Rural Appraisal carried out in the following districts of Bougainville: Buka, Selau-Suir, Tinputz, Wakunai, Arawa (Central), Buin, Siwai, Sovele (Bana), Torokina and Kunua. Centres visited were: Buka, Tinputz, Wakunai, Mabiri, Arawa, Aropanari, Oria, Tonu, Sovele, Torokina, Paru Paru and Kunua.

2.2 The team travelled by road from Buka to Arawa and by helicopter to other centres.

- Feeder roads at Tinputz, Wakunai, Aropanari, Oria, Buin, Torokina, Buka and Kunua were inspected.
- Gardens and fermenteries were inspected at Tinputz, Wakunai, Mabiri, Aropanari, Oria, Buin, Paru Paru, Buka and along the Buka-Arawa road. Plantations were also inspected along the road.
- Vocational centres were inspected at Tinputz, Mabiri, Aropanari and Buin. The old vocational centre at Koromira was overflowed but there was nothing to see because all the buildings have been destroyed.

2.3 Meetings were held with Provincial leaders and public servants, Chiefs and District public servants and representatives of donors in various centres. Topics discussed were:

- Agricultural crops, preferences for crops including cash crops, food crops and livestock. The progress in restoration and the performance of agencies currently in the field.
- Restoration of agricultural infrastructure such as dryers, fermenteries and feeder roads.
- Vocational training for agriculture, village life and basic literacy and numeracy.
- Credit requirements for rehabilitation of crops and infrastructure.
- The Micro Credit scheme.

2.4 In all of these discussions it was stressed that the proposal being investigated was for an integrated project incorporating all of the above aspects and that none of them would be looked at in isolation. The overwhelming interest and preference was for feeder road restoration and it was continually stated that this would not happen in isolation from the other parts of the package.

2.5 The team pointed out at all meetings that the promised EU assistance was being delayed due to litigation and would not be forthcoming immediately. Participants were informed that it was most likely that the project would concentrate on a few districts and that detailed studies would follow this report.

3. SUSTAINABILITY

3.1 One of the major problems facing the Bougainville government will be maintaining new and reconstructed infrastructure which is being provided by donors. As long ago as 1982 a report³ warned of the potential problems in maintaining services in the province after the closure of the Panguna mine. The President of the Bougainville People's Congress was emphatic that there would be no more large-scale mining on Bougainville, due mainly to environmental considerations⁴. This means that money to carry on the restored services will have to be generated from domestically raised revenues and national government grants and transfers. There is no indication of what arrangements will be made in this regard at the time of writing.

3.2 What is clear is that it will take large sums of money to restore services such as health and education as well as agriculture related services and that it is important that these are restored to a level that can be sustained into the future⁵. Failure to do so will lead to increased frustration amongst people who have high expectations.

3.3 Provincial Authorities are aware of this problem but were unwilling to disclose their strategy to deal with it due to the fact that funding arrangements with the National Government were still the subject of negotiations. It is important that the on-going maintenance costs of donor funded projects receive more attention and that the province put in place machinery to identify and plan for this in the future. It also highlights the need for fostering of economic activity so the province can generate its own internal revenue.

3.4 One possibility that was discussed was that all donor funds should be channelled through the provincial budget. This would be the same procedure as the National Government follows through the Aid Management Division of the Department of Treasury. It has the advantage of ensuring that the provincial management team are aware of all commitments and their likely on-going maintenance costs, it would also make it easier to co-ordinate aid and ensure that donors are communicating satisfactorily.

³ Economic Consultants Ltd; *North Solomons Provincial Development Report*; (North Solomons Provincial Government, Arawa), 1982

⁴ J. Kabi, pers. Comm., July 1999

⁵ Already the feeder roads on Buka are in need of repair and some parts are hard to negotiate, it was reported that the Department of Works had no funds for repairs.

4. THE PRESENT SITUATION

4.1 Funding arrangements for Bougainville are different to the rest of the country. Instead of getting grants under the revised Organic Law on Provincial Government, Bougainville is funded through the Office of Bougainville Affairs on a one-line grant through the Public Investment Programme (PIP). Both the national Government and the Bougainville Government recognise that this is a temporary arrangement until the final relationship between the two governments has been finalised.

4.2 In the meantime the grant to Bougainville has been K18 million for recurrent expenditure and a further K8.6 million for PIP expenditure in 1999. The majority of the PIP funds (K5.6m.) have not yet been received in the province which is blamed on the OBA. Only K3.m. has been received. A large proportion of the funds that have been received have been used paying outstanding commitments for 1998 and early 1999. The team pointed out that the Bougainville situation was not unique because the PIP was under-spent throughout PNG due to the National Government's shortage of cash.

4.3 The 1999 funding compares with the level of funding at K 5 million in 1982 and K5.8 m. in 1981. In real terms the grant has probably halved whilst the domestic revenue base has declined from K6.1m. to zero⁶. The crisis has created additional demands on provincial revenues because almost all services have had to be restarted from scratch. To make matters worse the grants that have been promised have not all reached the province.

4.4 Much of the slack has been taken up by a number of donors who are funding restoration projects and providing assistance for specific areas. Some of the agencies that are operating in Bougainville are European Union, AusAid, UNDP, New Zealand Aid, OED (Austria), OECF (Japan), USAID, Oxfam (NZ), Caritas, Peace Melanesia, a number of agencies funded through AusAid such as ADRA and the Bougainville Community Projects Scheme.

4.5 The large number of donors inevitably leads to some duplication and lack of co-ordination e.g the CCEA (funded through UNDP by USAID) was establishing a cocoa nursery at Tinputz, unaware that ADRA (funded by AusAid) was doing the same thing in the same district. It is important that provincial authorities take effective charge of this phase of development and ensure that there is not duplication and the inevitable rivalry, that such close associations will develop, do not endanger the projects that are being undertaken.

4.6 All agencies ostensibly recognise that the EU is to take the lead among the major donors in agricultural development. It is therefore important that a replacement for Mr Clarke, who is departing at the end of July be found and put in place as soon as possible. It is also important that the EU continue to maintain and further develop the close relationship that Mr Clarke has been able to develop with provincial authorities.

⁶ More than 50% of pre-crisis internally raised revenue came from mineral royalties and North Solomons Trust contributions. The National government Value Added Tax (VAT) is reportedly being collected in Bougainville and will provide revenue for the province.

4.7 In order to reflect the pre-eminence of the EU among donors in the agricultural sector the co-ordinator should be situated alongside one of the senior officers of the Department of Bougainville as an advisor. Ideally this would be in the planning or agriculture divisions of the department. Mr Clarke has enjoyed a close relationship with the Assistant Secretary for the Department of Primary Industry and his office is located in that department.

4.8 Agriculture in the province has been severely affected by the crisis. Most people were reduced to maintaining food gardens for their own consumption. People were herded together into care centres where many of them were fed rations due to the fact that they were afraid to leave the centres for fear of reprisals. In some places cocoa gardens were destroyed to make way for food gardens to feed care centres occupants. Economic activity in most of Bougainville came to a standstill and cash crops were overgrown and choked to death. It is estimated that more than half of the cocoa in Bougainville has been destroyed in this way (see 6.2.7 below).

4.9 One crop that has been revived in the province is rice, which was grown to provide food for many families during the crisis.



Plate 1. Feeder Road in the Wakunai Area

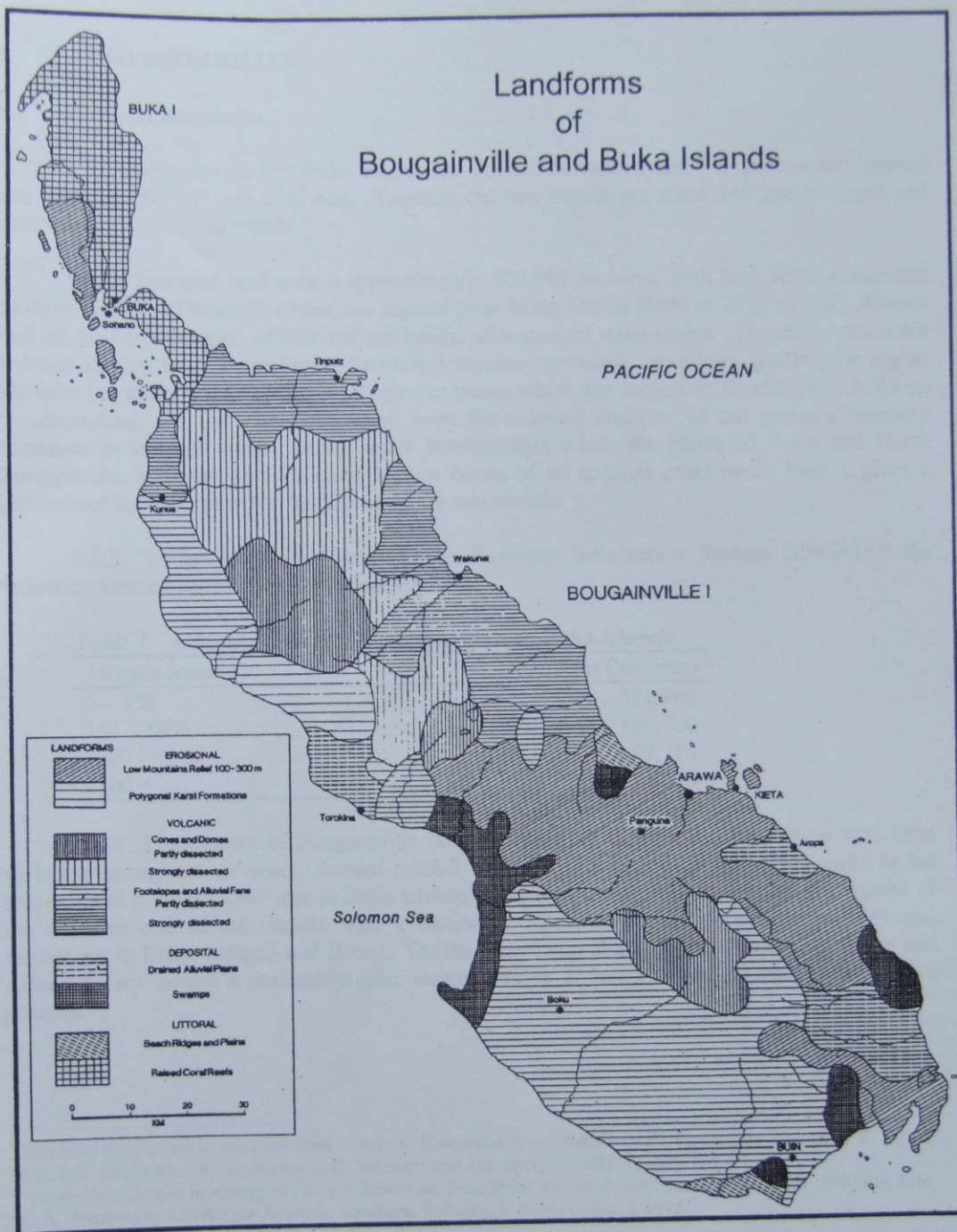
4.10 Infrastructure in the province has deteriorated badly. Most feeder roads are barely accessible because they have not been maintained for the duration of the crisis, many are unpassable by 4WD vehicle. Plantation and smallholder infrastructure for the production of cocoa and copra have either been physically destroyed or have become unusable due to neglect and non-use. Steel kiln pipes have been the worst affected and almost all of them have rusted away during the period.

4.11 Other infrastructure has also fallen into disrepair during the crisis and the vocational centres at Tinputz, Mabiri and Buin were all destroyed or looted to the extent that it will require very large expenditures to restore them. Work has commenced on the Tinputz vocational centre

but it is very slow due to lack of funds, Mabiri is also under reconstruction but little progress has been made at Buin.



Plate 2. Classroom at Buin Vocational School



Map 1. Landforms of Bougainville and Buka Islands

5. LAND SUITABILITY

5.1 Physical Resources

5.1.1 Bougainville and Buka islands are situated between 5 and 7 degrees south latitude and between 154° 30" and 156° east. Together the two islands are some 240 km in length and approximately 65 km in width.⁷

5.1.2 The total land area is approximately 900,000 hectares, with high relief dominated by three clusters of volcanic cones, the highest peak being Mount Balbi at 2715 m ASL. Almost half the land area consists of hills and mountains with straight steep slopes. The major plains are volcano-alluvial fans, formed on redistributed volcanic materials, have high gradients at higher altitudes but grading into gentler sloping relict plains which are subject to flooding and build-up by alluviation. In the south and south west the seaward margins of the plains commonly terminate in swamps locked in by sandy beach ridges while the plains of Buka and North Bougainville from the reef flats and lagoon floors of an uplifted coral reef. Map 1 gives a generalised impression of the landforms of the two islands.

5.1.3 Using the Papua New Guinea Resource Information System (PNGRIS)⁸ the following altitude zones have been identified:

Table 1. Altitude Classes of Bougainville and Buka Islands

Altitude (meters)	Area (hectares)
0 - 350	631,960
350 - 1000	165,760
1000 - 2100	99,715
2100 +	2590

5.1.4 The climate of Bougainville is wet tropical or tropical rainforest type with little variation throughout the year. Annual rainfall varies from a high of 5050 mm at Boku in the southwest to a low of 2347 mm at Buka airstrip in the north. Rainfall seasonality is a feature of the northern end of the islands with a distinctly drier period occurring between May and September at Buka, Sohano and Baniu. On the other hand Boku, Buin, Toimonapu, Kieta and Arigua do not exhibit a noticeably drier season. Table 2 shows rainfall characteristics for 11 stations.

⁷ This brief description is extracted from "Lands of Bougainville and Buka Islands, Papua New Guinea by R. M. Scott, P.B. Heyligers, J.R. McAlpine, J. C. Saunders and J.G. Speight, CSIRO L.R.S. No. 20, 1967

⁸ "Papua New Guinea Inventory of Natural Resources, Population and Land Use Handbook", 2nd Ed., PNGRIS Publ. No. 6. Prepared by CSIRO for AusAID, Canberra, Bellamy, J. & McAlpine, J., 1995

Table 2. Rainfall Characteristics for 11 Stations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual	Highest Annual	Lowest Annual
	Buka (10 yr of records)														
Mean Rainfall (mm)	279	282	310	203	152	109	114	152	142	173	213	216	2347	2883	2045
Mean No. of rain days	14	16	16	15	12	11	16	17	15	14	16	15	117		
	Sohano (17 yr of records)														
Mean Rainfall (mm)	340	269	338	287	165	137	130	155	150	178	246	282	2675	2878	2332
Mean No. of rain days	18	16	19	18	15	15	17	17	17	16	17	18	203		
	Kieta (26 yr of records)														
Mean Rainfall (mm)	218	231	353	325	234	277	300	257	170	245	245	272	3129	3790	2639
Mean No. of rain days	12	15	16	16	14	13	16	14	12	14	11	13	166		
	Buin (5 yr of records)														
Mean Rainfall (mm)	229	206	348	231	163	302	505	292	328	226	323	224	3373	3907	3007
Mean No. of rain days	16	17	18	17	17	17	23	19	17	18	20	17	216		
	Boku (9 yr of records)														
Mean Rainfall (mm)	399	267	480	465	292	417	419	559	452	429	462	409	5050	6068	4663
Mean No. of rain days	22	14	18	21	16	20	22	22	22	20	17	18	232		
	Kunua (5 yr of records)														
Mean Rainfall (mm)	236	178	310	173	168	163	216	254	241	234	268	188	2629	3574	2055
	Soraken														
Mean Rainfall (mm)	287	206	297	218	163	132	147	173	168	229	249	185	2456	3175	2108
	Teopasino (5 yr of records)														
Mean Rainfall (mm)	188	196	203	297	160	213	188	193	201	221	193	188	2443	2801	2009
	Arigua (5 yr of records)														
Mean Rainfall (mm)	183	193	325	191	254	201	259	211	216	175	241	191	2639	3010	2266
	Toimonapu (5 yr of records)														
Mean Rainfall (mm)	180	226	221	282	241	320	391	381	229	231	333	163	3178	4460	2449
	Baniu														
Mean Rainfall (mm)	213	226	264	226	112	137	102	71	94	147	170	142	1910	2063	1773

5.1.5 It is worth noting that rainfall data are available only for coastal stations thus making it difficult to obtain a clear picture of the overall rainfall pattern for inland areas. However, it is generally accepted that rainfall increases in amount and intensity with altitude, in particular where mountain features are aligned across the direction of the prevailing winds.

5.1.6 Climatic records for most stations are too short for detailed analysis of variability. It is, however, possible to deduce that the Northwest season produces the same amount of rainfall throughout the islands between December and April. We can conclude, therefore, that seasonal distribution of rainfall is due to the varying effects of the Southeast trade winds. The southern mountains of Bougainville cause these warm and moist winds to rise, thereby initiating increased precipitation in the area between May and October. In fact rainfall in the north of the island is less than half that of the south during the same period (Map 2).

5.1.7 Rainless periods are relatively short throughout Bougainville and Buka. Table 3 indicated the mean and longest observed periods without rain. The mean length of rainless period is generally low, while the longest dry period observed at Sohano was 14 days in August and 16 days at Kieta.

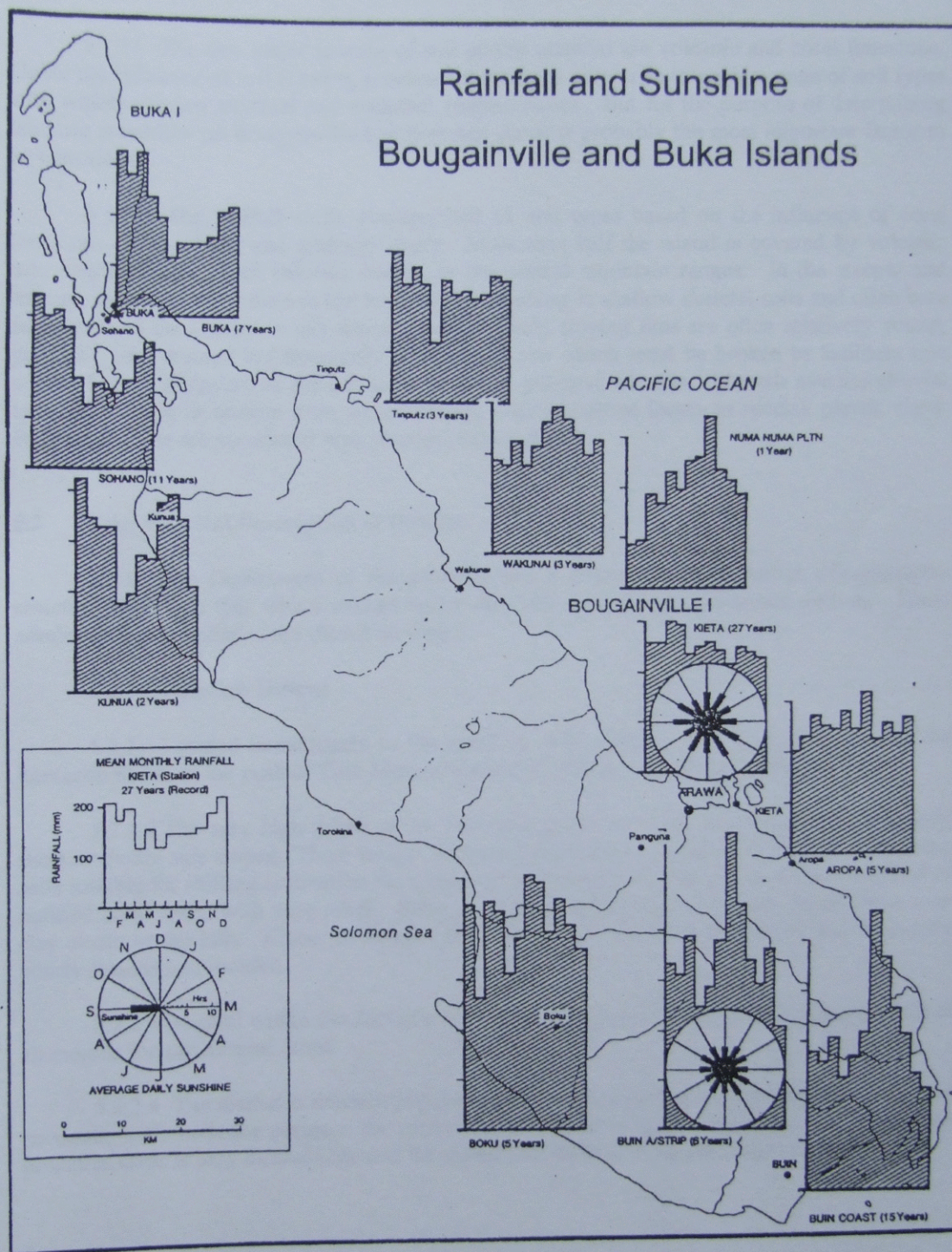
Table 3. Mean and longest observed period without rain

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	Sohano											
Mean duration	3.2	2.1	2.0	2.0	2.4	2.3	2.1	2.7	2.0	2.2	2.3	2.3
Longest observed	12	9	7	9	10	11	6	14	7	9	11	9
	Kieta											
Mean duration	1.9	1.9	1.9	2.3	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.3
Longest observed	11	7	9	13	9	10	9	16	12	13	10	11
	Buin											
Mean duration	2.3	2.1	3.0	2.0	2.2	2.1	1.5	2.1	2.1	2.1	2.0	2.1
Longest observed	8	6	10	4	5	9	5	9	7	7	6	5

5.1.8 The only other climatic element for which data are available is temperature. These data indicate the uniformity throughout the year over both Bougainville and Buka Islands. Generally, the mean annual temperature is 27°C, with mean monthly maximum temperature rising to 30.5°C and mean minimum temperature falling to 22.3°C.

5.1.9 The lowest temperatures experienced at Kieta and Buin are considerably lower than the lowest temperatures experienced at Sohano. This is a direct result of cold air masses descending from the mountains.

5.1.10 Other temperature differences measured on Bougainville are due to altitude. It is expected that normal lapse rates apply, that is a drop in temperature of approximately 0.5°C for every 100 meter ascent. This drop in temperature will, however, be modified by the prevailing strong maritime influence.



Map 2. Climatic Characteristics of Bougainville and Buka Islands

5.1.11 The two major sources of soil parent material are volcanic and coral limestone. Under the influence of soil forming processes these have given rise to a wide range of soil types with widely varying physical and chemical characteristics. But for the purpose of determining land use suitability on Bougainville soil drainage status is probably the most important factor to be considered.

5.1.12 The CSIRO study distinguished 11 soil types based on the influence of coral limestone, volcanic ash and drainage status. More than half the island is covered by volcanic ash, concentrated around volcanic centres in the central mountain ranges. In the steeper and strongly dissected areas the ash has been eroded resulting in shallow skeletal soils and often bare rock. Around the volcanoes ash deposits on the gently sloping fans are often relatively young, generally well drained but frequently have a hard pan which must be broken to facilitate tree crops. On the periphery of the ash soils are found ash-covered soils. The ash overlies alluvial material varying in texture from sands through well structured loams to reddish plastic clays. Frequently these are associated with swampy soils and peats.

5.2 Brief Physical Description of Districts

5.2.1 The Department of Bougainville has a district and sub-district administrative structure similar to that which existed under the 'old' provincial government system. These administrative boundaries are shown on Map 3.

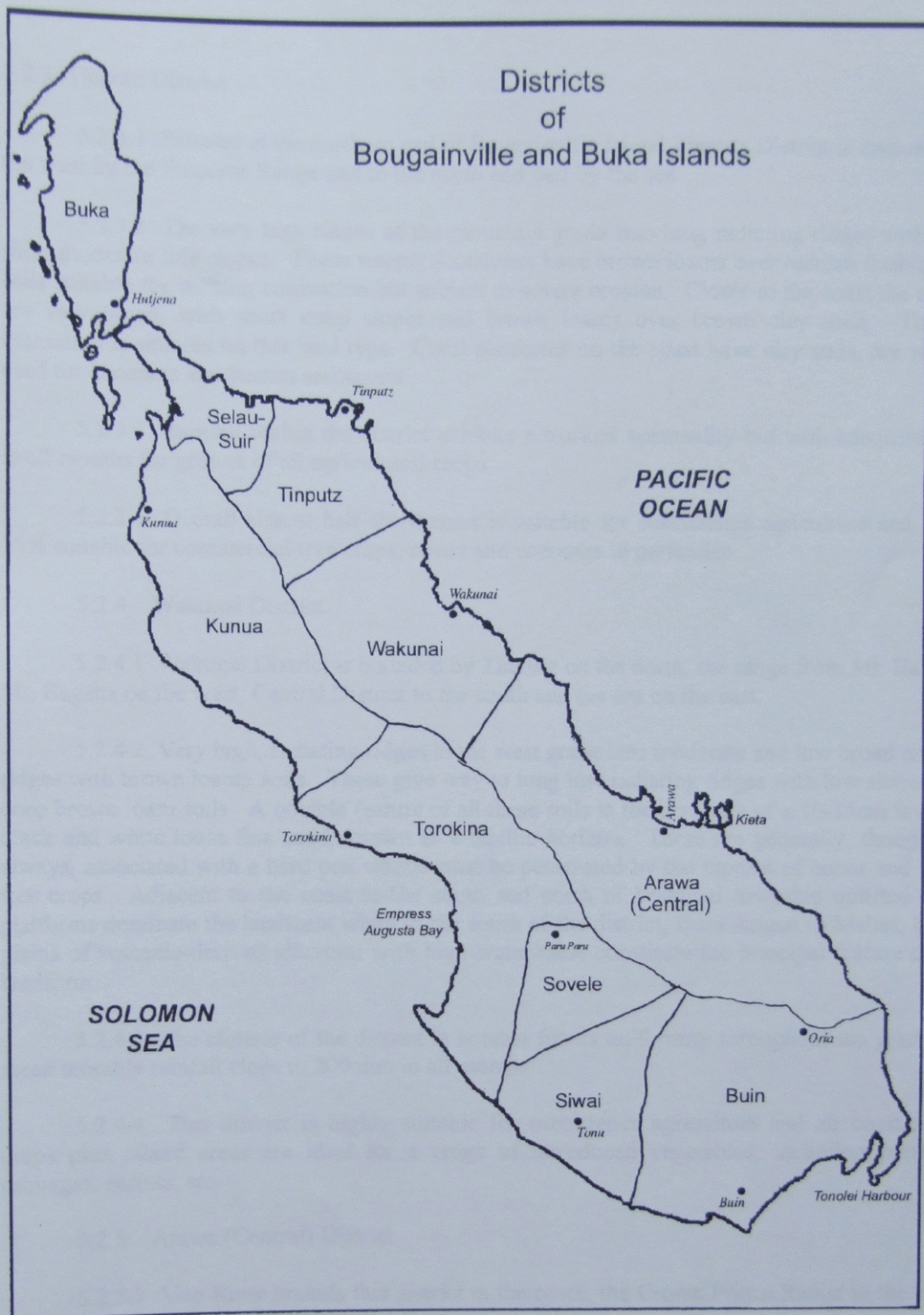
5.2.2 Selau-Suir District

5.2.2.1 Located immediately to the south of Buka Passage, it extends eastwards to the Ramazon River, to the peak of Tore Mountain and from there to the sea at Soraken Harbour.

5.2.2.2 The very high ridges of the mountain grade into long radiating ridges with very short moderate side slopes. These steeper footslopes have brown loams over reddish friable clay soils suitable for shifting cultivation but subject to severe erosion. The peninsula is comprised of uplifted coral reefs, with very relief. Soils are reddish sticky clays but with black loams over clay closer to the hills. Closer to Sohano the soils are deeper, more weathered and frequently poorly drained and mottled.

5.2.2.3 Rainfall within the district exhibits a marked seasonality but with adequate falls in all months for agricultural crops.

5.2.2.4 The district is densely populated and is well suited to subsistence agriculture and coconuts, with moderate potential for cocoa on the drier soils types. However, due to land use pressures there is only limited potential for expansion of the existing plantings of cash crops.



Map 3. Districts of Bougainville and Buka Islands

5.2.3 Tinputz District.

5.2.3.1 Situated at the northern end of Bougainville Island Tinputz District is enclosed on the west by the Emperor Range and to the north and east by the sea.

5.2.3.2 The very high ridges of the mountain grade into long radiating ridges with very short moderate side slopes. These steeper footslopes have brown loams over reddish friable clay soils suitable for shifting cultivation but subject to severe erosion. Closer to the coast the ridges are very broad, with short steep slopes and brown loams over brown clay soils. Tinputz Plantation is situated on this land type. Coral platforms on the coast have clay soils, are widely used for coconuts and human settlement.

5.2.3.3 Rainfall within the district exhibits a marked seasonality but with adequate falls in all months for growth of all agricultural crops.

5.2.3.4 Overall almost half the district is suitable for subsistence agriculture and some 15% suitable for commercial tree crops, cocoa and coconuts in particular.

5.2.4 Wakunai District.

5.2.4.1 Wakunai District is bounded by Tinputz on the north, the range from Mt. Balbi to Mt. Bagana on the west, Central District to the south and the sea on the east.

5.2.4.2 Very high, radiating ridges in the west grade into moderate and low broad crested ridges with brown loamy soils. These give way to long low radiating ridges with low slopes and deep brown loam soils. A notable feature of all these soils is the presence of a 10-15cm layer of black and white loose fine sand, known as a lapillic horizon. These are generally, though not always, associated with a hard pan which must be penetrated by the taproot of cocoa and other tree crops. Adjacent to the coast to the south and north of Wakunai township uplifted coral platforms dominate the landform while in the south of the district, from Arigua to Mabiri, broad plains of volcanic-derived alluvium with high water-table constitute the principal feature of the landform.

5.2.4.3 The climate of the district is notable for its uniformity throughout the year with mean monthly rainfall close to 200 mm in all months.

5.2.4.4 This district is highly suitable for subsistence agriculture and all coastal tree crops plus inland areas are ideal for a range of introduced vegetables, including potatoes, cabbages, carrots, etc.

5.2.5 Arawa (Central) District.

5.2.5.1 Vito River bounds this district in the north, the Crown Prince Range to the west, Luluai River to the south and the sea to the east.

5.2.5.2 The northern portion of the area is similar to the southern part of Wakunai District with steeply sloping high ridges grading into progressively more gently sloping fans and plains close to the coast. Soils with lapillic horizons are common. These grade into high, narrow crested ridges with very steep slopes and very shallow soils and sandy beach ridges close to the coast. Further south the mountain ranges are formed of dissected agglomerate plateau with steep cliffs and shallow soils. Adjacent to and west of Arawa and Kieta townships the hills are very steep with shallow brown loamy soils. In the southern region extinct or dormant volcanoes, Mt Takuan and Mt Taroka, are the main features of the landscape. Small areas of high altitude plains that occur on the north western slopes of Mt Takuan have moderate slopes and deep ash covered soils with high agricultural potential. Close to the coast swamps are common behind the beach ridges.

5.2.5.3 The climate in the district is remarkably uniform throughout the year with mean monthly rainfall close to 200 mm in all months.

5.2.5.4 Agriculturally this district is limited in its potential for coastal tree cropping, with the exception of coconuts and small areas of cocoa on the beach ridges and lower fans of the volcanoes. There is some potential for arabica coffee in the Kongara area on the high altitude plains.

5.2.6 Buin District

5.2.6.1 The southernmost District of Bougainville, with the coast forming its southern boundary, the north-eastern boundary being the Luluai River and the Mivo River as the western boundary.

5.2.6.2 Two extinct or dormant volcanoes, Mt Taroka and Mt. Loloru, dominate the landform for the district. These volcanoes are severely eroded and have broad radiating, moderately dissected fans extending outward. The fans have short and very steep side slopes. They grade into partly dissected plains of very high gradient and plateaux of gentle slope. Soils are generally brown, loams and clay loams with moderate drainage. Ash pans are common and these must be penetrated to allow rooting for tree crop agriculture. Lower down the slope these graduate through broad plains of ash covered alluvium with very low water table to low lying alluvium with high water table and subject to flooding. Localised areas of permanent swamp are common.

5.2.6.3 This is one of the wettest areas of Bougainville, with no distinct dry season and very high rainfall during the southeast trade-wind season.

5.2.6.4 With some deep, well-drained soils the area is well suited to subsistence agriculture and most coastal tree crops. However, the high rainfall, low sunshine hours and consequent low incoming radiation reduce this potential. Oil palm will not perform well under these conditions and there are reports of coconuts not achieving their maximum yields in the district.

5.2.7 Siwai District

5.2.7.1 Located in the southwest of Bougainville it is triangular shaped with the coast, the Mivo and the Hongorai Rivers forming the boundaries.

5.2.7.2 The extinct or dormant volcanoes, Mt Taroka and Mt. Loloru, form the apex of the triangle and dominate the landform for the district. These volcanoes are severely eroded and have broad radiating, moderately dissected fans extending outward, that have short and very steep side slopes. They grade into partly dissected plains of very high gradient and plateaux of gentle slope. Soils are generally brown, loams and clay loams with moderate drainage. Ash pans are common and these must be penetrated to allow rooting for tree crop agriculture. Lower down the slope these graduate through broad plains of ash covered alluvium with very low water table to low lying alluvium with high water table and subject to flooding. Areas of permanent swamp are common.

5.2.7.3 This is one of the wettest areas of Bougainville, with no distinct dry season and very high rainfall during the southeast trade-wind season.

5.2.7.4 With some deep, well-drained soils the area is well suited to subsistence agriculture and most coastal tree crops. However, the high rainfall, low sunshine hours and consequent low incoming radiation condition this potential. Oil palm will not perform well under these conditions and there are reports of coconuts not achieving their maximum yields in the district.

5.2.8 Sovele (Bana) District

5.2.8.1 Located on the south west of Bougainville Bana District is rectangular shaped, with the coast, the Puriata and Hongorai Rivers forming two boundaries and extending inland to the mountains.

5.2.8.2 The extinct or dormant volcanoes, Mt Taroka and Mt. Takuan, form the inland boundary and dominate the landform for the district. These volcanoes are severely eroded and have broad radiating, moderately dissected fans extending outward, that have short and very steep side slopes. They grade into partly dissected plains of very high gradient and plateaux of gentle slope. Soils are generally brown, loams and clay loams with moderate drainage. Ash pans are common that must be penetrated for tree crop agriculture. Lower down the slope these graduate through broad plains of ash covered alluvium with very low water table to low lying alluvium with high water table and subject to flooding. Extensive areas of permanent swamp occur close to the coast.

5.2.8.3 This is one of the wettest areas of Bougainville, with no distinct dry season and very high rainfall during the southeast trade-wind season.

5.2.8.4 With deep, well-drained soils the area is well suited to subsistence agriculture and most coastal tree crops. However, the high rainfall, low sunshine hours and consequent low

incoming radiation condition this potential. Oil palm will not perform well under these conditions and there are reports of coconuts not achieving their maximum yields in the district.

5.2.9 Torokina District

5.2.9.1 Torokina District, located on the west coast, extends from the Puriata River as it's southern boundary to the Laruma River as the northern boundary and from the coast to the watershed in the mountains.

5.2.9.2 Dissected agglomerate plateau remnants with precipitous slopes and high dendritic ridges with very steep slopes that constitute the mountainous area grade into high narrow-crested ridges on older sedimentary rocks with short, very steep slopes and shallow brown soils. They give way to extensive areas of permanent freshwater swamp between the beach ridges and the lower foothills. In the north of the district an active volcano, Mt Bagana, dominates the landscape. Just downward from the lower slopes the volcanic-alluvial deposits give rise to plains with braided streams and tall grass vegetation. The higher fans are well drained and have brown loam over sandy soils.

5.2.9.3 Although there are no climatic data for this district it is expected to have a similar rainfall pattern as that of Boku to the south, with very high rainfall and no distinct dry season.

5.2.9.4 Apart from the well-drained alluvial fans in the hinterland of Torokina, which are well suited to cocoa and coconut growing, the district is suited only for subsistence agriculture.

5.2.10 Kunua District

5.2.10.1 Kunua District, on the north-east of Bougainville, extends from Laruma River to Soraken and from Emperor Range to the coast.

5.2.10.2 In the south of the district very high, radiating ridges grade into moderate and low broad crested ridges with brown loamy soils. These are flanked to the east by an extensive dissected limestone plateau, the Keriaka Plateau, which extends to the coast. Further north the very high steeply sloping dendritic ridges grade into extinct volcanoes and moderately sloping, partly dissected volcanic fans. These fans have deep well drained brown loamy and brown loams over reddish clay soils. Isolated small areas of permanent swamp are found behind the beach ridges.

5.2.10.3 Climatic data for Kunua and Soraken confirm the seasonal rainfall distribution pattern, with a dry season between April and October. However, all months receive in excess of 100 mm of rain, which is sufficient for coastal tree crops.

5.2.10.4 The deep, well-drained soils of the volcanic fans and plains are highly suitable for all coastal tree crops, in particular cocoa and coconuts. In addition to these areas there are widespread areas suitable for subsistence food crop production.

5.3 Agricultural Potential

5.3.1 The overall potential for subsistence agriculture on Bougainville and Bula Islands is high to very high. With mean monthly rainfall in excess of 100 mm in all months and short rainless periods most smallholder gardens have a wide range of crops⁹. The average number of gardens per family is 2.0 and the average garden size is approximately 0.1 ha per person¹⁰.

5.3.2 Food security should not be a major concern. The 1982 Provincial Development Study noted that the traditional agricultural systems are 'not rigid and that changes and therefore improvements are possible'. The report by Bourke et al of 1998 and our own filed observations confirm this view. There is, however, a need to continue to introduce new planting material and maintain the current high level of production of the subsistence sector.

5.3.3 Care needs to be taken with expansion of gardening into steep lands within high rainfall zones. Soil conservation practices should be evaluated under these conditions, with evaluation plots established in farmers fields.

5.3.4 Rice growing should be encouraged as a rotation crop in the subsistence farming system but should not be promoted as a broad-acre crop.

5.3.5 Cocoa and coconuts provided the principal sources of cash from agriculture prior to the crisis and will continue to do so for the foreseeable future. Apart from the fact that it will take considerable time to develop markets for new crops it will also be necessary to create confidence in the minds of smallholders that any new crop has the potential to succeed. Traditionally smallholder farmers tended to follow the lead provided by the plantation sector, a lead not likely to be available to Bougainvilleans in the future.

5.3.6 Therefore, we believe that cocoa and coconut rehabilitation should constitute the cornerstone of the EU agricultural rejuvenation programme. Considering that since rehabilitation of cocoa and coconuts must be combined with infrastructure upgrading and maintenance, skills training and availability of credit, and all within a limited budget, it is essential to focus expenditure on those areas and/or districts that are likely to yield the best results. Map 4 shows the potential for cocoa on Bougainville and Buka islands¹¹.

5.3.7 Adaptability trials would need to be carried out before the potential for growing of vanilla in high rainfall zones could be determined. The effects of moulds on yield and quality would need to be investigated.

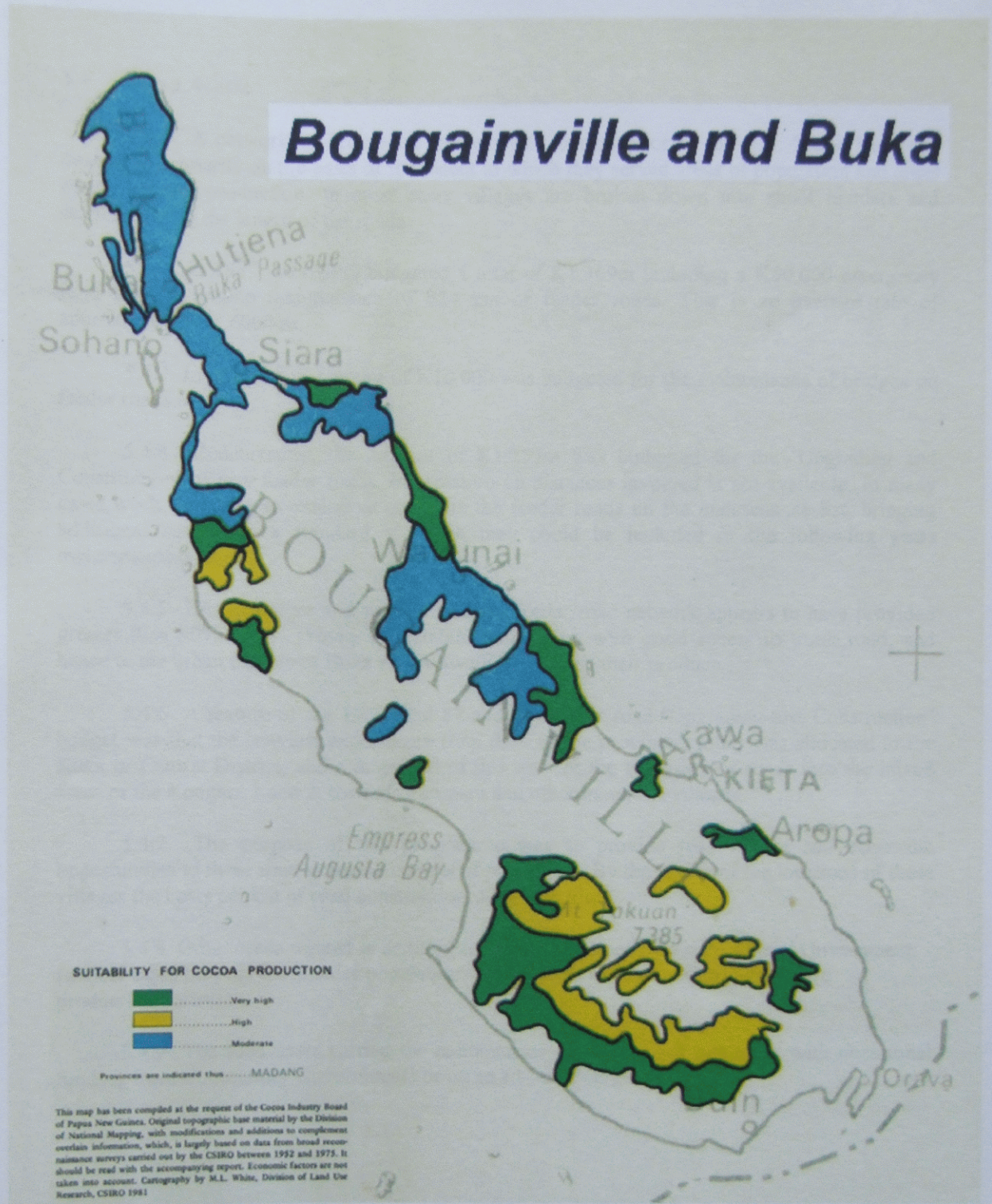
5.3.8 Similarly, adaptability trials on kava should be carried out before large scale planting could be encouraged. Since root development of the kava plant is most important it is expected to be well suited to higher rainfall areas, provided it is grown in freely draining soils.

⁹ Bourke et al 1998

¹⁰ North Solomons Provincial Development Study, Economic Consultants Ltd, Aug. 1982.

¹¹ Bleeker, P and Freyne, D.F., (1981), Inventory of Areas Suitable for Cocoa Growing in Papua New Guinea.

Bougainville and Buka



Map 4. Potential for Cocoa Growing on Bougainville and Buka Islands

5.4 Road Access

5.4.1 A network of Provincial feeder roads existed prior to the war. These had been developed primarily on the basis of the extent to which they served areas of population and areas of agricultural production. In most cases villages are broken down into small hamlets and scattered along the length of the roads.

5.4.2 In 1989 the NSPG budgeted a total of K1.369m including a K50,000 emergency fund for the routine maintenance of 824 km of feeder roads. This is an average rate of approximately K1,600/km.

5.4.3 In addition an amount of K10,000 was budgeted for the maintenance of bridges on feeder roads.

5.4.4 Concurrently, the amount of K1.255m was budgeted for the 'Upgrading and Construction' of new feeder roads. Information on distances involved is not available. In many cases work was done to extend or complete the feeder roads on the maintenance list, bringing additional km up to a standard at which they could be included in the following years maintenance budget.

5.4.5 This extensive and well maintained feeder road network appears to have provided greater than 90% of the provinces mainland population with good access to trunk road, and hence to the urban centres of Buka and Arawa/Kieta, to sell their produce.

5.4.6 A feature of the 1989 (and 87 and 88) feeder road 'Upgrading and Construction' budget was that the heaviest expenditure (one third of the province's total) was allocated to the Kieta or Central District, and a large part of this was for the extension of roads into the inland areas of the Kongara 1 and 2, towards Paruparu and other mountain villages.

5.4.7 The purpose of this programme was to provide road access and economic opportunities to these smaller inland centres of population. By the nature of the locations of these villages the costs per km of road construction were very high.

5.4.8 Other roads existed in addition to those maintained by the Provincial Government. In most cases they served smaller populations and/or areas of lower export agriculture production/potential.

5.4.9 The road users carried the maintenance of these roads out either with occasional funding from Community Governments or on an ad-hoc emergency basis.

6. AGRICULTURE – Current Activities and Potential for Rehabilitation and/or Expansion

6.1 Background

6.1.1 Agriculture has been and will continue to be the major source of income for the majority of Bougainvilleans. The most comprehensive set of data relating to agricultural production for pre-crisis Bougainville is that obtained during the 1980 Census. In addition, up until 1989, statistics are available for the volume of cash crops exported from the province. However, no attempt was made to identify the total area allocated to or the rate of expansion of area devoted to, either cash crops or food crops.

6.1.2 The main cash crops produced in both the smallholder and plantation sectors were cocoa and coconuts. Table 4 shows production of both crops from 1989 to the present. Smallholder farmers also produced vegetables for the formal and informal urban and rural markets. In addition, although produced in large-scale units, the province was virtually self sufficient in poultry, eggs and pig meat, while marine products were in ample supply.

YEAR	Cocoa	Copra
1989	18,441	26,755
1990	11,942	1,801
1991	3,146	1,984
1992	5,368	10,212
1993	5,442	11,051
1994	4,779	9,688
1995	5,108	5,358
1996	3,418	11,989
1997	6,109	14,323
1998	1,691	9,652
1999 (6 mths)	2,290	7,700

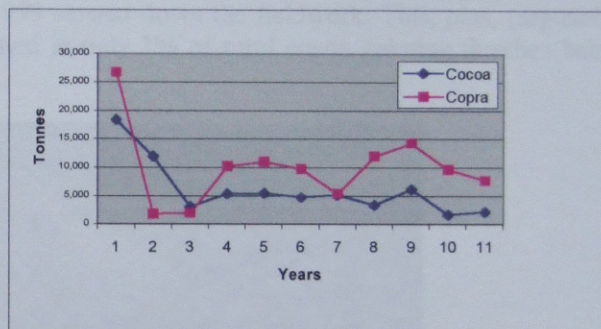


Table 4 & Fig 1. Cocoa and Copra Production 1989 -1999

6.2 Cocoa

6.2.1 Export of cash crops dropped dramatically during the crisis with all large-scale plantations and most smallholder blocks being abandoned and little or no maintenance being carried out. In situations where cocoa was well shaded, and/or planted densely enough to be self shading, it generally survived very well but where shade was light or non existent undergrowth quickly choked the cocoa trees (see Plate 3). This resulted in a rapid decline of many cocoa plantations. However, it is extremely difficult to obtain accurate data on the proportion of trees still producing, suitable for rehabilitation or totally lost or destroyed.

6.2.2 In order to determine the magnitude of any rehabilitation programme and to subsequently monitor progress an accurate survey of the current situation, in those districts selected for integrated development, will be essential. This survey will be carried out as part of the detailed project design.

6.2.3 Early in 1999 EU funded the CCEA to carry out a 'field sample census' with a view to providing the necessary base line information prior to planning a major programme to rehabilitate and increase cocoa production¹². The original intention was to survey sufficient smallholder's blocks so as to assess:

- i. The number of cocoa trees smallholders had before the crisis.
- ii. The number of trees which have been totally lost or destroyed.
- iii. The number of trees which are still existing and can be rejuvenated with pruning
- iv. The number of trees which could be suitable for future improvement through bud-grafting.

6.2.4 The UNDP report describes the report as follows:
"The survey paper (unfortunately as it turns out) grew from an envisaged 2 or 3 pages, to 13 pages and included questions on household size, labour costs, use of fertiliser, livestock production, receipt of extension services, source of inputs, income and expenditure and lists of assets".

6.2.5 The survey was carried out by CCEA working in close co-operation with the Bougainville Division of Economic Services, whose field staff undertook the fieldwork. "Political unrest in the early months of 1999 slowed down the fieldwork. This, plus, (arguably) the complexity of the questionnaire resulted in only 1% of rural cocoa growing families being interviewed."



Plate 3. Cocoa tree overcome by vines

A total of 232 farmers were selected for interview. Table 5 presents a summary of the results.

¹² Bougainville Rehabilitation, Reconstruction and Development Project, Report of the Assessment Mission (Primary Sector), June 1999, UNDP Office for Project Services, PNG/98/002/07/UNOPS

6.2.6 These statistics confirmed our observations during the course of our limited fieldwork. Several cocoa gardens visited were virtually totally lost and generally we observed greater than 30% loss. While minor differences between districts were noted the extent of these variations could not be confirmed during our rapid trip through the island. In Wakunai the Chairman of Rau CoE claimed that pre-crisis his area had some 35,000 cocoa trees and now has only 1,000. Similarly, at Oria the Officer in Charge of the Sub-District was adamant the more than half of all cocoa trees in the area pre-crisis were lost during the crisis. At Tonu the District Manager estimated that some 30% of farmers had lost all their cocoa, while the remaining 70% had rehabilitated their surviving cocoa, which amounted to less than half their pre-crisis area, and were now harvesting.

6.2.7 During our last district visit, Kunua, the District Manager claimed that hybrid cocoa trees were more likely to be lost through neglect than the traditional Trinitario variety. Unfortunately we hadn't heard this 'claim' at the time we visited the other districts and consequently could not ascertain if other districts shared the same experience.

Table 5. Summary of Results from the Survey of Smallholders Cocoa and Coconut Gardens.

No.	Information	Cocoa	Coconut
1	Number of households directly involved	15,715	8151
2	Number of hectares	47,774	32,391
3	Existing plantings		
	Bearing	8,676,160	4,265,733
	Immature	2,157,183	274,246
	Senile	1,917,160	42,697
	Total	12,750,503	4,585,676
4	Damaged trees		
	From crisis	14,251,391	529,751
	From drought	5,203,568	336,822
	Total	19,454,959	866,573
5	Intention of growers to replace damaged trees		
	% intending to replace	91.9%	40.2%
	- within 3 months	26.9%	19.6%
	- within 6 months	50.5%	43.1%
	- within 12 months	17.6%	19.6%
	- other	5.0%	17.6%
	Total number of trees to replace	14,661,813	1,556,584
6	Future plans to extend block plantings		
	% planning to extend	59.6%	26.8%
	Total number of trees to plant	13,721,450	831,968
7	Condition of farmer blocks		
	% cleaned	87.3%	87.3%
	% willing to clean	97.6%	94.5%
	% cocoa pruned	69.8%	N/A
	% with appropriate tools	19.1%	66.9%

6.2.8 Large proportions of farmers are clearing up their old cocoa gardens in preparation for receiving new hybrid planting material. Some have become impatient and have resorted to planting seed collected from the Trinitario lines in their existing gardens. Although to date only two agencies appear to be engaged in hybrid seed distribution, CCEA and ADRA, there is little if

any co-ordination of effort. This matter needs to be addressed as a matter of urgency and at the same time a closer working relationship needs to be established between aid agencies and DPI staff.

6.2.9 The current policy of initially supplying each farmer with a sufficient number of seed/seedlings to plant one hectare should continue and, although only a minor detail, it is important that all agencies involved adopt a uniform approach to the quantity of free seed supplied. On the basis of 720 plants per hectare CCEA is supplying each farmer with 720 seeds while ADRA is supplying 1000 seeds. Taking into account potential losses at germination it is recommended that CCEA increase the number of seeds supplied to 1000. Where seedlings are available from a central or village nursery 720 should be supplied.

6.2.10 More attention needs to be paid to the establishment of nurseries. Prior to the establishment of permanent material central nurseries arrangements will need to be put in place for transport of seedlings to farmers gardens. Not only will it be essential to provide tractors and trailers, or some other suitable means of transport, but the upgrading of feeder roads will need to be completed, an almost impossible task to achieve in a very short time. It is therefore recommended that the seed distribution programme concentrate on establishing bush material village nurseries in the short term.

6.2.11 The current seed distribution programme will need to be improved. In numerous cases plastic bags were not supplied prior to delivery of seed, with the result that hybrid cocoa seeds were planted 'at stake', i.e. directly into the field. Needless-to-say, the results were not effective. Extension services need to be re-established and undertaken in conjunction with seed/seedling distribution, with existing farmers reminded of, and new farmers given instruction in, basic nursery practices and cocoa husbandry.

6.2.12 Where there is existing cocoa, not enough attention is being paid to rehabilitation primarily due to a lack of information on pruning and budding. CCEA staff are expected to accept responsibility for all cocoa extension and need to be 'retrained' in pruning and budding techniques. Funding will be required for refresher courses.

6.2.13 The single item of agreement between all districts and sub-districts visited was the fact that virtually all fermentaries/driers need to be renovated. In a limited number of cases this simply means replacing the kiln pipe and/or drier beds but the majority of buildings also need major repairs. Plate 4 shows the effect of lack of maintenance on a community owned fermentary.

6.2.14 Again it was impossible to get an accurate figure on the number of fermentaries/driers in any single district pre-crisis, although most districts quoted figures in the hundreds. At the same time, it was claimed the number of fermentaries currently working in any district was claimed to be between 10 and 30. There was, however, general agreement that it would not be feasible, necessary and/or cost effective to replace all fermentaries/driers. Nevertheless, we believe that there are some 1200 units which should be constructed as soon as possible. There is an immediate and urgent demand for kiln pipes. Other materials are generally available in the village, while village youth and young farmers will be provided with sufficient

training in sawmilling and carpentry, under the proposed vocational training programme, to carry out the construction.



Plate 4. Kiln pipes need replacing in this drier located near Oria Station in Buin District.

6.2.15 Farmers in Buin were not keen to adopt the new solar driers developed by CCRI. It was generally felt that demonstration units should be established and tested in all districts before Bougainvilleans would begin to adopt the technology. These demonstration units are being established by CCRI (see Page 37).

6.2.16 There is some justification for this attitude in view of the fact that, in the high rainfall areas of South Bougainville, poor performance of coconuts was attributed to low sunshine hours¹³. Solar driers would need to be evaluated in a range of these environments before widespread construction of the units can be promoted.

6.2.17 Major problems are being experienced with the marketing of cocoa and copra. Apart from the poor condition of feeder roads there are few if any vehicles available at district or village level. Old and broken down four wheel drive utilities, often without brakes, are the principal means of vehicular travel for people and movement of farm inputs and/or produce. The condition of the few remaining vehicles is such that unless they are able to generate income and have access to credit in the very near future many villages will be without any form of transport.

6.2.18 The situation is particularly critical in the west coast districts of Torokina and Kunua. At Torokina there are no vehicles whatsoever, with the result farmers are carrying their

¹³ Sumbak, J. H., 1970, Poor coconut growth in south-west Bougainville. Papua New Guinea Agric. Jour. Vol.2, No.1

cocoa for distances of up to 10km to the point of shipping. The Kunua 'port' access road is now almost impassable and will soon be negotiable only by tractor, but since there is no tractor in that part of the district these people will again have to resort to carrying their produce.

6.2.19 All districts are wrestling with the problem of moving seedlings from central nurseries to the planting area and while various suggestions have been made there is still no solution. The UNDP report suggests "that trailers manufactured with motorcycle wheels and pulled by a 125cc motorcycle as commonly used in some Asian countries could be appropriate for delivery of seeds to nurseries and even seedlings from nurseries to farmers." A number of other means of moving seedlings were discussed, including the use of buffalo as draught animals. However, the most practical option was the use of tractors, as there are additional uses for a community owned tractor. The community at Torokina, in anticipation of receiving a tractor and trailer from EU several months ago, established a 'company' to operate and control its use. Materials were accumulated for the construction of a shed in which the tractor and trailer would be parked and a scale of charges (on a basis of kilometers travelled) drawn up.

6.3 Coconuts

6.3.1 Although the second most important and at this point in time the most immediately available source of cash income, little attention has been given to further development of the copra industry. Almost one million palms were lost during the crisis and the 1997 drought. According to the CCEA survey farmers intend replacing these coconuts. In fact, if the results of the survey accurate farmers intend planting in excess of 1.5 million palms, an expansion of the current plantings.

6.3.2 In the late 80's DPI recommended that farmers intending to plant coconuts should use hybrid material obtained from the cross between Malaysian Red Dwarf x Renell Island Tall. This cross has the potential to provide yield of 2 tonnes per ha under smallholder conditions and with addition of fertilizer and improved management farmers should obtain yields of double that amount (Pers. Com. T. Ovasuru, July 1999). However, DPI's programme of establishing several seed gardens across the country was shelved, in response to insect pest problems which devastated hybrid coconut plantings on the Gazelle Peninsula and New Ireland, the location of the largest number of new plantings. Fortunately, these problems were not very serious in Bougainville. Consequently, it is recommended that DPI's advice should now be applied with respect to coconut replanting for the Bougainville agricultural rehabilitation programme.

6.3.3 The availability of hybrid planting material will, to a large extent, determine the speed of the replanting programme. CCRI's capacity to produce seed nuts is limited to some 30ha of seed garden at it's Omuru Station. Optimistically this seed garden will produce some 300,000 seed nuts per year but as there are already large outstanding orders from other provinces, now planting coconuts in response to recent high prices for PNG copra, it is difficult to ascertain the number of nuts which might be available to Bougainville. In the absence of hybrid seed nuts farmers should be assisted in selecting seed nuts from the best material within

their existing gardens. To this end, CCRI's coconut breeder should be funded for a visit to the province to identify 'superior tall palms'.

6.3.4 Meanwhile most farmers are content to clean up their blocks and harvest available nuts. The Executive Officer for North Nasoi Council of Elders was adamant that the best assistance EU could give farmers in his area would be to supply equipment to clean their coconut blocks. This would enable farmers to obtain cash to start work on cocoa and their other activities.

6.3.5 As with cocoa most copra dryers were destroyed during the crisis on Bougainville. There is an immediate need to repair existing dryers and construct new ones. Where possible cocoa dryers should be used to dry copra until the situation improves.

6.3.6 Comments provided above with respect to transporting cocoa are also applicable with respect to copra. However, in view of the larger quantities and lower value relative to cocoa farmers are less likely to carry sacks of copra for long distances. The need for tractors at all stations is urgent.

6.4 Rice

6.4.1 Rice has become an important crop in the gardens of many subsistence farmers in Bougainville and as a result of recent increases in the price of imported rice it is likely to continue to be grown by a large number of farmers. Discussions with a number of farmers indicate that they have developed rotations within their subsistence gardens and that the value of using legumes in the rotation, immediately prior to the rice crop, is fully realised. They have also observed that continuous cropping of rice in the same garden increases the incidence of pests and diseases.

6.4.2 While serious pest and disease damage was not seen it is easy to envisage, and anecdotal evidence confirm, that problems can and do occur. Farmers are using the same seed material for several cropping cycles within the same block and will move to a new block only when yield from that block falls to a level where it is considered no longer worthwhile. Use of chemicals is not a viable option since farmers are not equipped with knapsack sprayers and, even if chemicals were readily available, they probably cannot afford to purchase inputs for subsistence crops.

6.4.3 It is recommended that a quantity of new seed be provided. Seed is available free of charge from the Republic of China (Taiwan) rice project based in Lae.

6.4.4 At the moment farmers are threshing the rice by hand and using a crude wooden version of a mortar and pestle to mill it. Needless-to-say this latter process results in a considerable proportion of cracking of the rice grains and ultimately loss through development of moulds on the cracked surfaces. Because of the time involved in 'milling' with a mortar and pestle and the problem of broken grains growing moulds, farmers mill only the amount the family is about to consume at any one meal. It is therefore not surprising that in all districts visited we received requests for rice mills, either motor driven or hand operated.



Plate 5. Rice is grown as a rotation crop in many gardens.

6.4.5 Hand operated mills are the preferred option, supported by the fact that a motor driven rice mill, purchased in Siwai District in 1992, has been idle since 1994 waiting for spare parts. Also hand operated rice mills are relatively cheap, have a limited number of parts that are subject to wear and are easily transported. One or two machines, in each village that has significant numbers of rice growers, would solve a major problem and encourage more farmers to grow the crop for home consumption and sale.

6.4.6 Where appropriate, funding should be provided through DPI for the purchase and supply rice mills. Arrangements could be put in place in each village for the co-operative use of these mills. The CoE could supervise access to the mill and apply a small charge, either in cash or as a small proportion of the rice milled. Any funds so generated should be used for repairs and maintenance and/or purchase of additional units.

6.4.7 Transport of rice is not an issue where the crop is grown for home consumption and milling facilities are available in the village. However, milling equipment is not available in any district of Bougainville at the moment.

6.4.7 While some farmers and villages are producing in excess of their requirements there is no possibility of selling at the markets due to difficulties with their current milling systems, quite apart from the total lack of transport.

6.4.8 Grain storage and protection from rats and mice is a major problem once the crop has been harvested. One farmer constructed a raised platform in the garden on which he stored his rice with plastic sheeting under and over the grain.

6.5 Livestock and Poultry

6.5.1 As stated earlier Bougainville was self sufficient in pig meat and poultry products, meat and eggs, prior to the crisis, with one large piggery near Arawa and several large chicken units in Central District. With no properties surviving the chaos of the last ten years, pigs and

poultry are now confined to villages and while many farmers raise pigs, chickens and ducks there is an acute shortage of meat products in all districts, with the possible exception of Buka. Live chickens, sold within the village or at the markets, are commanding prices of up to K15 each¹⁴. Needless-to-say many farmers would like to start chicken production as soon as possible.

6.5.2 During the crisis ducks have become an important source of protein in many villages. It is anticipated that duck production will continue to be a village level operation, with most birds consumed by the household and any surplus sold on the local markets.

6.5.3 Under the micro-credit scheme, currently being managed by the Bougainville Council of Women (BCW), 16 loans have been granted for poultry projects as of June '99, and in addition there were some 27 outstanding applications for assistance with poultry projects. The difficulty associated with transporting chicken feed into districts like Buin, Siwai and Sovele (Bana) is probably the principal reason for the 'large' number of outstanding applications for chicken projects. The BCW has determined that loans for chicken projects will only be granted after arrangements have been made for chicken feed delivery to the applicant prior to, or at the same time as, the day-old chicks. The speed of reconstruction of wharves and/or restoration of feeder roads will determine the rate of development of the poultry industry.

6.5.4 Although there is an immediate demand for pig meat it will be difficult to redevelop the industry in Bougainville. DPI officers at Arawa made an attempt to raise improved pig breeds for distribution to farmers but abandoned the project after all their piglets were stolen. The only indication of anybody taking positive action to restart pig production was a single application received by the BCW under the micro-credit scheme. We do not recommend that pigs be considered as part of this project.

6.5.5 Cattle production has all but ceased on Bougainville and Buka islands. The only report of cattle still existing on Bougainville was received at Mabiri Education Centre. Kompeni villagers took cattle, owned by the Catholic Brothers at Mabiri prior to the crisis, into the hills and were planning to return an unknown number to the mission station in the near future. It is not known how many animals taken by the villagers actually survived the crisis period and/or how many were added to the herd through breeding.

6.5.6 District staff at Arawa requested assistance to revive two cattle projects in Central District. Time did not permit a visit to these projects to ascertain the status of fencing, yards, etc. It is recommended that this be the subject of investigation during the detailed write-up of individual projects.

6.5.7 Some interest was shown in farming rabbits, even though initial attempts to introduce them to Bougainville have not been overly successful. It was reported that only a single rabbit has survived on Buka Island. Many people expressed reservations about introducing rabbits on environmental grounds, fearing that they would inevitably become wild and cause soil loss and landslides as a result of burrowing. Agricultural extension officers need

¹⁴ Whilst this price seems excessive, it was stated that the demand for feasts, especially reconciliation feasts, was greater than what could be supplied. It is doubtful that this demand will continue into the future on any other than a very localised and one-off basis.

to educate the people and establish demonstration units at strategic locations around the province.

6.5.8 Experience in Irian Jaya suggests that rabbits perform best in the cooler highland regions. Similar observations have been made about the limited number of trials and commercial introductions on the mainland of Papua New Guinea. It is felt that, at least in the short term and at a minimal cost, rabbits could make a significant contribution to the diets of the people of Bougainville, particularly those in remote and higher altitude areas.

6.5.9 There are no abattoirs on Bougainville and at this stage there is no justification for developing such facilities.

6.5.10 Development of the pig and poultry industries will depend largely on re-establishing a road network, but while all production is consumed in the village there is no need for marketing facilities and/or transport of chickens and pigs for sale. However, commercial development of the industry, to the point where towns such as Arawa, Wakunai and Buka Passage are supplied by local production, will depend on improved port facilities and road network to allow farmers access to a reliable source of feed supplies.

6.6 Alternative Crops

6.6.1 The crisis and halt of mining has caused farmers and administrators to consider the type of economy Bougainville is likely to have for the future. In the short term, most people consulted are content to rely on an eco-friendly, agricultural based economy. To this end many have experimented with 'new' crops. The two most talked about crops are, Vanilla and Kava, although Cardamom and Potato were also mentioned by DPI.

6.6.2 In 1997 AusAID supplied a quantity of seed potatoes to the Rotokos area of Wakunai, with the result that considerable quantities of potatoes are now being produced, in addition to cabbages, carrots and other vegetables. The District Manager, Wakunai is confident that production from the Rotokos area could supply all the requirements of Buka and Arawa if access was improved, plus regularly sell produce to Rabaul if Wakunai had reliable shipping services. Nevertheless, despite major problems with transport, produce from the area is available in Buka.

6.6.3 Vanilla and Kava were observed in one well-maintained garden in Siwai District. The owner of the garden was not present at the time of inspection so it was not possible to get a first-hand report as to his aspirations and interests when he planted these crops. We were told that the owner had attained some expertise in the growing of vanilla during an assignment on the Gazelle Peninsula and that he is simply experimenting with Kava.

6.6.4 The vanilla garden inspected was densely shaded with the result that a high proportion of leaves were covered with a black mould (see Plate 4). The combination of dense shade and high rainfall creates ideal conditions for growth of fungus on the vanilla vines. Basic adaptability trials would need to be carried-out to determine the optimal spacing and shading for

vanilla under high rainfall conditions before the crop could be widely grown in South Bougainville. However, despite the less than ideal conditions and over shading the vanilla vines were robust, with abundant flowering and long beans. All prunings were being used as a mulch around the base of the plants and the inter rows were clean weeded.

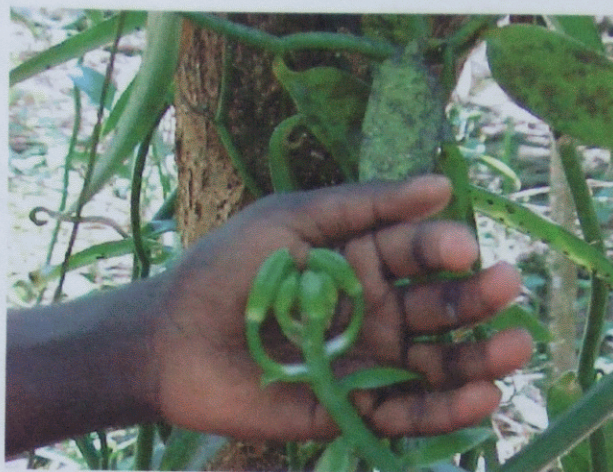


Plate 6. Leaves are covered with mould but these flowers are just about ready to open.

6.6.5 Kava was recently introduced to the garden, with some 100 plants inserted in the pathway around the vanilla block. The kava plants are growing very well (Plate 7) with no evidence of nutrient deficiency or insect attack.



Plate 7. Kava is planted around the perimeter of the vanilla garden

6.6.6 Two other crops are worthy of attention, Cardamom and Arabica Coffee, neither of which are cultivated on Bougainville at the moment, although there would appear to be some potential in the Rotokos and Kongara areas. These areas are deemed marginally suitable for

arabica coffee and moderately suitable for cardamom. The principal determining factor is likely to be mean minimum and maximum temperatures at the relatively low altitude. An investigation should be made of the depression of maximum temperatures associated with island ranges. McAlpine *et al* (1983) made note of the fact that lower temperatures at Panguna suggest that 655m ASL could be equivalent to temperatures at 1200m ASL in the central highlands of PNG. Heyligers (1972) observed that vegetation boundaries associated with altitude occur at lower heights on coastal ranges than in the highlands.

6.6.7 Of the crops discussed above vanilla is likely to prove most difficult to process. While the processing procedure is relatively complex and time consuming the price obtained depends totally on the quality of the dry bean. It has been suggested that McCormack, in conjunction with Agmark Pty Ltd., are considering installing a processing unit on the Gazelle Peninsula; thus if sufficient quantity could be produced on Bougainville a similar arrangement might be possible.

6.6.8 Coffee processing to the parchment stage is straightforward and relatively cheap and could easily be arranged at little cost in the event that an industry got underway. Cardamom processing is simply sun drying.

6.6.9 Comments made regarding road access in respect to cocoa and other crops also apply here.

6.6.10 At the time of visiting the Siwai vanilla garden, one harvest had taken place and the farmer's family had undertaken processing to the dried green bean stage. The produce had not yet been sold so it was not possible to obtain a guide to the price per kg that might pertain to the area.

6.6.11 Prior to embarking on expanded planting of vanilla, or any other alternative crop, it will be essential to arrange for reliable and regular market outlets and if possible ensure competition. Currently, buyers visit the smaller centres of the province at irregular intervals, thereby creating uncertainty in the minds of farmers as to when they might realise payment for the work.

6.7 Agricultural Research and Extension

6.7.1 Research

6.7.1.1 Although the need for research was mentioned by a number of persons there was no identification of specific areas which lacked the necessary information to allow a technical or business decisions to be taken with respect to embarking on agricultural investment. It must be stressed that the need for research would need to be very carefully documented and a cost-benefit analysis undertaken prior to embarking on any long-term investment in this area.

6.7.1.2 It was reported that DPI has a research position as part of its establishment, with duty instructions focussed on researching and monitoring changes in prices of alternative crops

on the international markets. It would appear that for a province such as Bougainville, which at least in the short to medium term would be a price taker rather than setter, that such a position is a luxury which cannot be justified. An economist, who would assist in programme design, provide support for agricultural credit schemes and monitor programme implementation should staff this position.

6.7.1.3 At no time during our visit did it appear that farmers had reached that point in the development process when an information gap between existing technology and farmers requirements constrains further progress. On the contrary it was evident that:

- the prevailing systems of food production are very mature, well balanced against risks and provide a degree of nutritional diversity. The Director-General of NARI remarked that "the people generally looked healthy and the level of physical health appeared of a higher level relatively when comparing with other parts of Papua New Guinea"¹⁵
- biological improvement of food crops already in use would yield only small improvements. However, we should not lose sight of the need to obtain regular supplies of planting material.
- the introduction of new crops could show more potential than the improvement of the existing crops, assuming that for the cocoa and coconut replanting programmes currently recommended hybrids are available.
- composting and manuring shows considerable potential to improve yields and shorten fallow periods. As cash cropping expands land pressures are likely to become much more important than here-to-fore.

6.7.1.3 Farming systems research was mentioned as an immediate need to ensure sustainability of cocoa, coconuts, other cash crops and food crops in the overall farm programme. It must be pointed out that while it seems justified to take a more holistic view of the farm and the interactions between different farm components, it should be also be recognised that farming systems research will guide but not replace the research on farm components. In this regard it is important to erase conceptual confusion, from the minds of both research staff and agricultural administrators.

6.7.1.4 Research on agronomic aspects of individual crops should continue to be undertaken at central research stations, with adaptability testing being undertaken on farmers blocks in Bougainville.

6.7.1.5 Specialist problems requiring research, such as, entomology and plant pathology, could be carried out by NARI scientists making site visits and/or linked to outside research institutions.

¹⁵ V. Kambori, 23/10/98. Report on Bougainville Trip by Director General, Monday 18th October to Wednesday 20th October 1998.

6.7.1.6 It is more urgent in the short to medium term to fill the gap between the research stations dealing with food crops and the extension officer. This is generally considered the responsibility of the research agency and in this regard the commodity research institutes, CCRI and CRI, have Research Liaison Officers as part of their core staff. When operating effectively this arrangement provides extension officers with the latest recommendations from the researchers and of equal importance creates an avenue for feedback to the researcher with respect to problems in the farmers field. The Research Liaison Officer may also assist with the establishment of demonstration blocks.

6.7.2 Extension

6.7.2.1 The highest priority should be given to increasing smallholder productivity, through the application of existing technology. This requires a well-trained cadre of staff, a clearly defined and focussed programme and the necessary resources to enable the service to perform.

6.7.2.2 The function of an agricultural extension service is foremost to transmit to producer's innovations, which have been developed by research and tested by applied research. In the early stages of development it is normal for the service to carry out promotional activities, which the private sector is not yet prepared to undertake, but later could take over. These include production and distribution of seeds, supply of specialist tools (e.g., for pruning and grafting), and marketing of new crops (e.g., vanilla) in areas where, once larger volumes are being produced, the private sector could take over marketing. Once the farms have been developed extension services concentrate on advising farmers how to improve their production.

6.7.2.3 The long-term goal for the province should be a unified extension service, staffed with well-qualified extension workers who could advise on a wide variety of farm problems backed up by different subject matter specialists. These specialists would in turn receive from the research station's packages of recommendations, which had been tested under farm conditions and would establish demonstration blocks at strategic location within the province.

6.7.2.4 It seems that this level of expertise will not be available in Bougainville for several years, therefore the 'interim arrangement' of having CCEA provide services for the two most important cash crops is the correct approach. CCEA's approach of involving selected farmers as transmittal agents (VEO's) and thus involving the farming community is to be commended.

6.7.2.5 DPI extension officers are hopelessly under-resourced and in need of training. Any programme to rehabilitate agriculture in the province must address this issue as a matter of priority. In the meantime several officers have been seconded to CCEA in order to support cocoa and coconut rehabilitation.

6.8 Other Agencies

6.8.1 There are several agencies currently involved in or ready to assist in the programme of agricultural rehabilitation on Bougainville. The largest and most comprehensive of the current programmes is that of UNDP operated through CCEA. However, with the European Union taking the lead role most are waiting to identify areas of intervention, which are not covered in the EU programme. A brief description of each agency and its proposed involvement, in as much as that could be ascertained, is provided here.

6.8.2 Department of Agriculture and Livestock (DAL). No information could be found on specific assistance proposed by DAL for Bougainville, other than the normal support provided to other provinces of PNG. For most provinces this is now confined to in-service training for extension officers and assistance with planning and budgeting. DAL's assistance is now channeled through NARI, NAQIA, CCEA, CCRI, CRI, etc.

6.8.3 National Agricultural Research Institute (NARI). NARI has drawn up a 'proposed research programme' for Bougainville to be based at CCRI's Duncan Research Station at Mabiri, Wakunai District¹⁶. The programme as outlined would "include food crop and small livestock for improvement of the food supply, and some alternative cash crops, especially vanilla, to provide cash earning opportunities to smallholders."

6.8.4 The programme would be carried out on 50 ha of land at Mabiri and require the establishment of offices and staff housing, involving an expenditure of some K885,000 in the first year. Operating cost in Years 2 & 3 are estimated at some K155,000 and K175,000 respectively. If we assume aid funding is available for establishment and operating costs until the end of Year 3 and inflation of 10% per annum, the province would need to make provide funding of some K200,000 in Year 4. This would be the minimum expenditure to ensure sustainability.

6.8.5 Quite apart from the cost of establishing facilities and operating the sub-station it was apparent during our visit to Mabiri Education Center that ownership of Duncan Research Station 'might' be the subject of lengthy negotiation with two competing traditional landowners groups involved. As far as we could ascertain, to date no attempt had been made to discuss the issue of ownership with either group.

6.8.6 Using a minimum number of staff, an applied research programme is proposed with adaptive trials being carried out on farmer's fields. The station land would be used for demonstration purposes and multiplication of planting material and small livestock for distribution

6.8.7 National Agricultural Quarantine Inspection Authority (NAQIA). Establishment of quarantine facilities and support for agricultural protection programmes is the responsibility of NAQIA. Until international ports are re-established in the province there is no need to establish facilities. Meanwhile, contact with the Authority should be maintained and reporting systems for pests and diseases put in place.

¹⁶ Memorandum from the Research Programme Leader, LAES to the Director General, NARI dated 9 October 1998

6.8.8 PNG Cocoa & Coconut Research Institute (CCRI). CCRI will play a key role in the rehabilitation of agriculture on Bougainville. It has already established Kubu Research Station on Buka Island and nominally has a much larger facility, Duncan Research Station, at Mabiri just south of Wakunai. Although, as mentioned above, while there are likely to be some problems with respect to gaining access to Duncan Research Station Provincial DPI staff are confident that with careful negotiation these problems can be overcome.

6.8.9 Kubu Station has a cocoa demonstration block of hybrid cocoa, a small nursery, a demonstration solar dryer and is fabricating solar drier kits for sale to villages (Pers. Com., H. Punus, July '99). At the time of our visit it was reported that 5 solar dryers had been established on Buka Island during 1998 and 3 on Bougainville in 1999, 1 each at Tinputz, Buin and Siwai¹⁷.

6.8.10 The programme of establishing solar dryers at several locations for evaluation in high rainfall zones should continue, with regular field days organized for local farmers. If use of these dryers proves successful in South Bougainville the problem of drying cocoa will be alleviated to a large degree. In the time available it was not possible to get an impression of the interest in solar dryers in those areas with a distinct dry season, Buka, Tinputz and Wakunai, where solar dryers are most likely to be successful. An extensive extension exercise will be required to ensure the technology is adopted.



Plate 8 Solar Drier at Kubu Research Station.

¹⁷ For a number of reasons, mainly transport problems, the distribution of these units has been very slow and kits have sat in Buka for more than a year.



Plate 9. Solar dryer kit ready to be despatched.

6.8.11 The most important role of CCRI, however, is in the supply of SG2 hybrid seed. The CCRI position is to supply all seed from Kerevat if possible and with the Kerevat seed-gardens capable of producing 8 million seeds in 1999 it should be possible to meet all PNG's requirements¹⁸. It is understood that there is also a seed garden at Duncan Research Station, which could be used if the need arises.

6.8.12 The situation is not as promising with regard to the supply of hybrid coconut seed nuts. As noted earlier, CCRI's capacity to produce seed nuts is limited to some 30ha of seed garden at it's Omuru Station, which at best will produce some 300,000 seed nuts per annum. In addition, this amount has to supply some outstanding orders from other provinces it is difficult to ascertain the number of nuts which might be available to Bougainville

6.8.13 Cocoa Coconut Extension Agency (CCEA). CCEA has established itself on Bougainville and, with funding provided by UNDP, is moving ahead with distribution of hybrid cocoa seed to farmers in all districts. A comprehensive report on this programme was compiled for the UNDP Office of Project Services by it's visiting consultant in June 1999 and it is assumed that those reading this report will be familiar with the UNDP report.

6.8.14 In summary, UNDP funded CCEA for the purchase of 100,000 cocoa seeds in 1998 and a further 500,000 seeds in 1999. These seeds would be distributed free of charge to farmers at the rate of 720 per cocoa growing family, this being sufficient for 1 ha of smallholder cocoa under normal conditions, assuming that the farmer obtains 100% germination. In addition to funding the cost of seedlings UNDP is providing some funding for staff salaries,

¹⁸ Letter from J E Moxon to Louis Kurika dated 19th November 1998.

infrastructure, nursery operation costs, tools and equipment, transport costs, training and initial capital for maintenance of the seed garden at Duncan Research Station.

6.8.15 CCEA's Provincial Extension Manager provided a summary of seed distribution by district, statistics that are at variance with those presented by UNDP's consultant.

Table 6 Cocoa Seed Distribution by District

Area/District	1998 (April – Dec)	1999 (Jan – June)	Total
Siwai	180,300	48,050	228,350
Buka	104,400	49,050	153,450
Tinputz	25,740	18,650	44,390
Buin	9,400	42,840	52,240
Nagovisi	19,600	2,100	21,700
Selau/Suir	6,700	31,300	38,000
Kieta	5,000	24,700	29,700
Torokina	23,120	1,600	24,720
Soroken	11,000	19,300	30,300
Wakunai		9,900	9,900
TOTAL	385,260	247,490	632,750

6.8.16 Detailed records of seed distribution and germination rates, by farmer and by district, are being maintained by the CCEA office in Buka, examples of which are given in Appendix 4. The summaries provided were compiled from these figures. Statistics for germination rates were not summarised and time or resources did not allow copying of all these records for later analysis.

6.8.17 The proposed staffing levels and current 'staff-on-strength' for CCEA's operation on Bougainville is presented in Table 6. It was reported that funds had not been released resulting in some staff (DEO's and FEO's) being paid an "advance on salary", salary which is expected to be paid sometime in the future. In this type of situation it is understandable that a full cadre of staff have not been recruited. However, as soon as funding is made available the Provincial Extension Manager expects to engage an additional 12 Village Extension Officers.

Table 7. Staffing establishment, 1999 ceiling and staff on strength.

Position	Establishment*	1999 Ceiling*	Staff on Strength**
Provincial Extension Manager	1	1	1
Senior Extension Officer	1	0	1
District Extension Officer (DEO)	11	6	6
Field Extension Officer (FEO)	22	0	8
Village Extension Officer (VEO)	120	25	13
Loans Officer	1	0	0
Project Accounts Officer	1	0	1
Project Officer	1	0	0
Administration Officer	1	0	1
Typist Secretary	0	0	1
TOTAL	159	32	32

Source: *UNDP Report, June 1999 and **CCEA Records, Buka.

6.8.18 With the exception CCEA is represented in all districts of Bougainville and would appear to have comparatively good staff numbers on Buka Island.

Table 8. Deployment of Extension Staff by District

District	DEO	FEO	VEO
Buka	1	1	6
Selau/Suir	1	1	
Tinputz	1	1	
Wakunai		1	
Central		1	
Buin			
Siwai		2	4
Bana	1		
Torokina	1		
Kunua		1	
TOTAL	6	8	13

6.8.19 Adventist Development Relief Agency (ADRA). Funded by AusAID, the ADRA programme for agriculture is confined to nursery establishment and seedling distribution in the Tinputz area. The need to co-ordinate this exercise with other agencies in the district is discussed elsewhere in this report

6.8.20 Australian Agency for International Development (AusAID). AusAID has a very large restoration programme for Bougainville, including small projects in agriculture. However, the project which is likely to have the greatest impact on agriculture is that designed to restore the trunk road system. In addition to its involvement to date, AusAID is waiting to see the final design of the EU agricultural programme before it adopts a larger component of assistance the sector. We were given to believe that AusAID might be willing to assist with the repair of cocoa fermentaries/driers (Pers. Com. J. Westcott and R. Ferraris, July 1999).

6.8.21 United Nations Development Programme (UNDP). UNDP, apart from the assistance to Agriculture being provided through CCEA, has a major programme on Bougainville. Details of all programmes are well documented and freely available.

7. MAINTENANCE OF FEEDER ROADS

7.1 Current Condition of the Feeder Roads

7.1.1 Since 1989 there has been no programme of maintenance on the previously listed feeder roads. Some maintenance has been done in some districts on some roads when the availability of funding and equipment coincided. Often payment for work done has not been made in full for some considerable time after completion.

7.1.2 Some other emergency repairs have been carried out by hand on impassable sections. In many cases complete failures have left the road no longer open to traffic beyond a certain point. Because of the war and the condition and, at times, the partial closure of the trunk road the focus of the network has changed in some districts away from Buka and Arawa/Kieta to more localised points where a number of coastal shipping vessels have established ports of call. This has resulted in the former feeder roads to these ports gaining increased importance.

7.1.3 The short visits to each district enabled a visit only to parts of one road in each district - perhaps representing typical conditions. Other insights were gained from discussion with government officials and local leaders met in each district.

7.1.4 The climate and topography of Bougainville provides high levels of stormwater run-off, which have to be controlled on and around roads to prevent damage. Our visits revealed that generally roads through flat country were in reasonable surface condition, enabling steady progress at speeds of up to 25km/hour. The overgrowth of vegetation in some cases had served to retain the road formation and table drains. These roads tended to be damaged to a greater or lesser extent where minor watercourses crossed them.

7.1.5 In Buin, for instance, on the coastal plains some large 1.5m diameter culverts had been washed out by flood waters leaving very dangerous steep approaches to a wet crossing. In Wakunai washed out small culverts left rocky wet crossings that although rough did not prevent vehicles from passing.

7.1.6 In areas where roads followed a gradient severe damage was evident where surfacing material had been completely removed by rain and the underlying formation had developed deep ruts such that passage even by 4WD was difficult or impossible. In these cases we were told that vehicles no longer use these roads and produce is carried out and goods and supplies carried in.

7.1.7 The rehabilitation of feeder roads to the pre-war standard will require in some cases a heavy application of maintenance effort, extensive resheeting and in places localised reconstruction particularly to reinstate water crossings and the reforming and resurfacing of hill sections.

7.2 Costs of Rehabilitation

7.2.1 A detailed inspection of each road would be necessary before more accurate cost estimates could be made for the rehabilitation of these roads.

However, given that:

- operating costs have increased in Kina terms by a factor of around 3 since 1989,
- the mileage of feeder roads listed has increased by 50% and
- the rehabilitation costs could be assumed on average to be 3-4 times the previous preventative maintenance costs,

It is estimated that the expenditure of between K16.5m and K22m would be required at 1999 values to "rehabilitate" the feeder road network of mainland Bougainville. (i.e. not including Buka, and Nissan Island.) This is a cost of about K16,800 per Km.

7.2.2 In discussions with the Department of Bougainville's Technical Services Division they have suggested a rate of between K15 – K20,000 per kilometre for feeder road rehabilitation.

7.2.3 It is further estimated that an annual preventative maintenance budget of some K4m-K5.5m would be required to maintain the rehabilitated network on Bougainville Island in good condition throughout each year.

7.2.4 In addition there are the recurrent operating (overhead) costs of the Dept of Bougainville's Technical Services Division to implement these programmes.

7.2.5 For comparison the EU funded roadworks on Buka island in 1998 saw the rehabilitation of 117km of roads at the cost of approximately K10,000 /Km. Operating conditions on Buka are much easier than on Bougainville. Buka has numerous developed deposits of coronas - an excellent road material, and in general the roads are on level country.

7.3 Cost Uncertainties

7.3.1 There are still many abnormal factors affecting operating costs in the province, particularly in central and southern Bougainville, e.g. lack of insurance, banking and communications and many other basic services. In addition the feeder roads continue to deteriorate with each rainfall. Not until a programme of work is underway will realistic rehabilitation rates begin to emerge. It will be important for future planning that:

- a detailed record is made of the condition of a road before work commences,
- accurate time and cost records of rehabilitation progress are maintained,
- and out of these records cost rates are determined for various types of work in different country.

7.4 Current Road Works

7.4.1 The PNG Department of Transport & Works does not implement any road works on feeder roads in the province. They have engaged a contractor under the "PTB3" period contract

rates to do emergency maintenance and improvements along the gravelled sections (most of) the Arawa to Buka Trunk road.

7.4.2 An AusAID funded project is about to commence to rehabilitate the trunk road network. This is a necessary pre-requisite to enable a programme of feeder road rehabilitation to take place and in most areas to enable such a programme to have an impact. AusAID has committed an amount of K23m over the next 3 years to build the roads from Kokopau to Siwai with a branch to Kunua and Torokina¹⁹

7.4.3 With little internal revenue being raised currently, the province depends on cash flow from the National Government that is erratic and not to the full amounts expected. Consequently there appears to be no detailed programme of feeder roads maintenance.

7.4.4 A separate EU funded programme - The Bougainville Port Infrastructure Project is considering undertaking improvements to certain feeder roads that serve established ports of call for coastal vessels. This covers access to Kangu, Mamagota, Marau, Torokina and Kunua from the hinterland. It is believed that the AusAID Trunk road programme will also be upgrading the roads to Kangu and Mamagota where new wharves are to be built with AusAID funding.

7.4.5 In order that any funding made available from whatever sources be put to best use there is a need to prioritise work to be undertaken on the road rehabilitation programme. Social issues and post -war considerations make this a difficult task and one not based solely on population and agricultural production potential.

7.5 Details of Feeder roads and locally identified Priorities

7.5.1 Discussion with Provincial Technical Services and input from the EU's Buka based office Trevor Clarke have provided the information. In summary by District this is tabulated below with the 1989 figures given in brackets.

Table 9 Bougainville roads.

District	No. of Roads		Length	
Selau/Suir District	8 roads	(8)	57 Km	(58)
Tinputz District	24 roads	(10)	153 Km	(72)
Kunua District	8 roads	(7)	28 Km	(24)
Wakunai District	13 roads	(10)	133 Km	(100)
Torokina District	4 roads	(4)	27 Km	(27)
Central District	29 roads	(26)	147 Km	(142)
Bana District	19 roads	(10)*	190 Km	(101)
Siwai District	19 roads	(14)*	140 Km	(76)
Buin District	28 roads	(21)	274 Km	(182)
TOTALS	152 roads	(110)	1149 Km	(782)

7.5.2 These lists do not include feeder roads on Buka or on Nissan Island. Note that Bana and Siwai (asterisked) were formerly combined in the one Boku District. Some of the roads

¹⁹ Moses Kaliau, pers comm, Arawa, July 1999.

to shipping port areas they remain listed here under Bana. Selau roads were previously listed under Buka and Suir roads previously under Tinputz.

7.5.3 These lists identify a total of 1149 Km of feeder roads. The pre-war feeder road lists not including Buka or Nissan had a total distance of only 782 Km. This indicates an additional listing of 367km of feeder roads. An increase of more than 50%. A small part of this can be accounted for as the additional mileage upgraded or constructed in 1989. There are a few road names appearing twice - perhaps two routes? Some roads, e.g. the road to from Buin town to Kangu beach were previously listed as Trunk roads, but are included in these Feeder road lists.

7.5.4 However clearly a number of additional roads have been added to the lists. Mileage in Tinputz has increased from 86km to 153km, in Bana from 101km to 190km, in Buin from 182km to 262km (even after adjusting for Kangu access), in Siwai from 76km to 140km, and in Wakunai from 100km to 133km. These increases will have to be confirmed.

7.5.5 It must be assumed that most of these additional roads were never built to any standard. Hence their "Rehabilitation" will in reality be an "Upgrading" and will inevitably be at far greater cost rates than the upgrading of similar roads in the vicinity that were previously built and maintained to standard.

7.6 Sustainability

7.6.1 The current availability of funding is in real terms a fraction of the 1989 average per Km maintenance costs. This situation is unlikely to change significantly in the short to medium term. A major rehabilitation of the trunk road network is about to commence. Upon completion the province will have to maintain that asset to avoid a future re-collapse of the network. Obviously trunk roads will take preference over feeder roads.

7.6.2 There is therefore a great danger that an Aid Intervention on the feeder roads can merely provide a one-off improvement leaving the asset to degrade back to its pre intervention condition. For example the roads around Buka rehabilitated with EU funding last year while generally in good condition, now require mostly small emergency repairs in a few areas to prevent serious damage that could close the road and would subsequently involve far greater costs than regular preventative maintenance.

7.6.3 It is essential that the province be able to determine the future funding levels likely to be available for maintenance and thus the extent of the kilometres that this will cover. These distances must be used to prioritise further the roads that any intervention should rehabilitate. **The Project Design of the intervention must be cognisant of the maintenance funding reality post intervention.**

7.7 Rehabilitation Work

7.7.1 The following activities will be required to rehabilitate feeder roads in the Province. Discussion with Technical Services Division and input from the EU's Buka based office. Trevor Clarke has provided the indicative average costs associated with these tasks.

1.	Vegetation Clearing	K200/km first time & K100 thereafter
2.	Table Drain clearing	K150/km, required twice/yr.
3.	Culvert clearing	3no./km, K70ea, required twice/yr.
4.	Culvert repairs or replacement	2no./km, K250ea/900Ø culvert, K500/km
5.	Re-sheeting	K10,000/km
6.	Patrol grading	K2,500/km first time and K1,000/km thereafter.

7.7.2 Bridge redecking and causeway repairs will be required as necessary, however in general there are very few such structures on the Bougainville's feeder roads. The costs for culverts appears not to allow for concrete headwalls or any stream bed protection e.g. concrete aprons / reno mattresses. In some situations adjacent to streams, some gabion basket retaining walls may be required. These don't appear to be costed.

7.7.3 These indicative rates suggest a total per km of around K14,000, which is about the lower end of our range given above under the heading of "Costs of Rehabilitation"

7.8 Resources for Rehabilitation

7.8.1 Other than grass cutting and obviously manual tasks the majority of feeder road works were undertaken by heavy equipment prior to the war. The availability of heavy equipment is restricted at the time of writing of this report. In the North West two formally established contractors are working on emergency repairs to the trunk road between Buka and Wakunai.

7.8.2 In south and central Bougainville there are a number of locally owned groups with a collection of mostly very old pre-war plant mostly in very poor condition. We understand that the AusAID funded Trunk Road programme will be providing a large amount of assistance to the local groups to get their machines into fair running condition and to give them as much work as possible. If this strategy were successful then it would appear that the availability of plant in most districts would be sufficient to undertake the work planned for funding by the EU.

7.8.3 The plant has been idle for many years and rebuilding will be costly and time consuming. It can be expected to have a very high level of downtime as parts that have not been renewed give way. It is not recommended that this strategy be followed and the intervention **should carefully the costs and benefits of using plant reconditioned in this manner.**

7.8.4 It has been the practice in recent years to contract grass cutting and other labour tasks to village groups along the road. Arrangements for this and established rates are well understood. **The intervention will be designed to use local labour wherever possible.**

7.8.5 Because of the extensive network of well-maintained roads that existed pre war the best sources of road gravel for road construction are generally well known. River gravels are used except where coronas deposits are available in North Bougainville. Different areas of the province have different materials. The materials are generally used in their natural state even although they are often characterised by poor particle size distribution. In some areas a lack of fine and mid range particle sizes makes them difficult to place and compact into a tightly bound

pavement. The removal of the worst of the oversize stones can be done either with a "grizzly" or less satisfactorily by hand picking.

7.8.6 In other areas fine sized particles predominate and the roads are more vulnerable to stormwater damage. Local knowledge and experience will provide the best solutions for the supply of aggregate. It is not clear whether or not gravel royalties will be claimed for materials used for Feeder road construction as distinct from Trunk road works. It is likely that this will be on a case by case basis.

7.8.7 Culvert Pipes, cement and reinforcing steel, and gabion baskets will be required to effect some of the needed repairs. The volumes required must be assessed after completion of detailed road inspections. These would have to be imported to Bougainville from Rabaul or Lae. Orders should be placed well ahead of time to allow for logistical delays. Funding of local transport and secure storage will be required. Timber for bridge decking and concrete formwork should be available locally from the increasing number of small sawmills and chainsaws in Bougainville.

7.9 Construction Standards

7.9.1 Previously the feeder roads were built with a minimum sheeting thickness of 150mm and with a 5m to 6m carriageway widths. Although this width was not required for the light traffic that feeder roads carry, which would require only a 3.5m—4m carriageway width, it was found that a width of 6m allowed construction traffic, particularly trucks hauling road surfacing material, to operate most efficiently

7.9.2 The additional width has the advantage that a progressively narrower road can be maintained to a good surface standard for longer, despite the gradual loss of surfacing material. In some places, particularly in steep country, narrower widths are acceptable for short distances. Where a spread of heavy plant is used these standards will apply. In areas where only a few trucks are operating reduced widths can be used to save costs.

7.9.3 The Technical Services Division is in agreement with the foregoing paragraphs.

7.9.4 Unlike a bridge or a building the construction of roads can have an impact even if partially complete. However unlike a bridge or a building a road even if well built can deteriorate rapidly under the conditions prevailing on Bougainville. If, as is likely, the funds available are insufficient to rehabilitate the whole length of a road the temptation will be to fix only the worst parts in order to reopen the whole road. This must be tempered with the need to bring at least a portion of the road up to a standard that can be maintained at minimal cost in future years.

7.10 Climatic factors affecting construction

7.10.1 Different parts of the province have different rainfall patterns. Generally the south is wettest in mid to later months of the year and the north wettest between Christmas and Easter. A rainfall map is provided earlier. Considerable efficiencies can be achieved by timing

work to occur in the dryer seasons. This does not always hold true but over a number of years will bring better results.

7.11 Alternative and complimentary strategy

7.11.1 Where major reconstruction is required there is only one option and that is to build good roads using the traditional spread of heavy equipment. However from our limited observations it is the opinion of the team that, particularly in level country, a considerable portion of the roads could be rehabilitated and maintained manually. Even in hilly country when undertaken as regular maintenance of a road built to standard, simple hand tool methods could achieve results more economically and reliably, simply because the work can be done as and when required.

7.11.2 Manual maintenance would have the following added benefits:

- puts money into the local village economy at each road location
- provides deployment/employment opportunities
- develops useful skills that can be applied to small private roads
- provides a village with the means to maintain it's roads without the need for heavy equipment
- makes road maintenance possible even when government funding unavailable.
- gives a village more control over it's situation.
- enables urgent work to be done whenever it is required.

7.11.3 This strategy could be particularly significant if, as in our opinion at present, there is insufficient recurrent funding available to maintain the feeder roads in the traditional manner even assuming they are all rehabilitated to standard.

7.11.4 Training courses could be run in each district with trainees working on actual road projects, learning by doing. The Council of Elders could nominate course participants who once trained would form a core group of feeder road maintenance foremen, able to organise and direct activities on a number of roads. With 1,145km of feeder roads in 9 districts, an average of 13 participants attending 9 courses would produce a trained foreman for every 10 Km of feeder road.

7.11.5 In practice the larger districts might have 2 courses such that more than enough foreman were trained to allow for some participants not completing the course or not taking up positions. A grant could be given to each CoE to cover wages of the foreman, hand tools, and allowances for hiring village labour groups to carry out the work under leadership of the supervisor. In the future as CoEs established a revenue base the allocation of locally raised funds could be added to the provincial grants to improve the frequency of maintenance or increase the mileage of maintained roads or both. Alternatively (and in emergency situations) the whole village might turn out on a community workday to maintain their road.

7.11.6 This strategy would devolve the skills, power and responsibility of feeder road maintenance from the Provincial Technical Services Division to the Council of Elders and to the

village users of the road. It would provide opportunity for young men many of who are ex-combatants to do manual work of great benefit to their communities.

7.11.7 The Technical Services Division are in agreement with the inclusion of this manual alternative being included in this report. They warn however that nowadays people expect to be paid for this sort of "government" work. Much will depend on the initiative of local leaders to adopt and develop this strategy in the interest of their people. If provincial government resources are scarce, demands for unreasonable pay will be impossible to meet and then the communities will have to make their choice between either maintaining the road themselves or putting up with a damaged road or no road at all.

7.11.8 The intervention will make a careful assessment and evaluation of the costs and benefits of different construction methods bearing in mind that labour intensive methods will provide other benefits such as getting business going again.

Supervision

7.11.9 In most districts the Division of Technical Services has Technical Officers some of whom have road engineering training and are currently deployed in emergency trunk road repairs and grass cutting organisation. The rehabilitation of the trunk roads may enable these technical officers to focus their work more on feeder roads at least in the short term. Currently the following Technical Services staff are available:

HQ	1 x Engineer
	1 x Technician
	1 x Road Works Supervisor
Siwai	1 x Rural Technical Officer (roads)
Buin	1 x Rural Technical Officer (roads)
Torokina	1 x Rural Technical Officer (roads)
Wakunai	1 x Rural Technical Officer (buildings)
Sovele	1 x Rural Technical Officer (buildings)
Siwai	1 x Rural Technical Officer (buildings)
Tinputz	1 x Rural Technical Officer (buildings)
Selau/Suir	1 x Rural Technical Officer (buildings)
Kunua(Saposa)	1 x Rural Technical Officer (buildings)

7.11.10 The Building Technical Officers now have some experience and skills of roading works particularly in organising and supervising manual work such as grass cutting/culvert clearing.

7.11.12 To implement a major feeder roads rehabilitation there would likely be a need to increase the numbers of trained roading technical officers and their housing, transport and other operational costs would have to be met. These overhead costs would be minimised initially if, as has been the practice since the war, these officers were recruited from within the district where they would work.

7.12 Detailed Technical Information

7.12.1 For more detailed Technical Information the reader is referred to Richard Green's report for NZODA entitled "Technical Assistance for the Bougainville Transitional Government - Stage One" Final Report 1 Aug 1998.

7.13 Other Infrastructure

7.13.1 The draft proposal includes the provision of training courses using upgraded or new facilities at Vocational Schools. During the mission we visited the Tinputz (operating) and Buin (not operating) Government Vocational Schools, the Mabiri Catholic Mission Vocational School (just being re-established) and the Paruparu Education Development Centre (established during the war).

7.13.2 We also talked with a NZ aid worker assisting the Aropanare Vocational School now relocated from its village origins to Arawa Town. We spoke with Reinhard Lorenz, an experienced Austrian Volunteer who has just embarked on the reconstruction of the Catholic Mission's Koromira Vocational School.

7.13.3 The construction of new classroom and workshop type facilities is generally being done with locally sawn timber. This is excellent as it maximises local manual and material resources to a project. It was noticed however that the construction system being used is of a conventional stud frame/nail plate truss type requiring the addition of expensive manufactured lining and fasteners respectively. In addition the timber must be accurately cut to achieve good finish and full strength joints.

7.13.4 The production of larger numbers of small section size timbers is more time consuming and a less efficient use of a sawmill. This writer has experience in Building Design using post and beam construction systems that use fewer lengths (but larger section size) of timber, are more tolerant to the use of rough sawn timber and can produce finished buildings with minimal imported inputs at a lower overall cost. The use of such systems in any new buildings required by this programme would not only lead to financial savings but would be a better model for improved village buildings.

8. VOCATIONAL AND APPROPRIATE SKILLS TRAINING

8.1 Background

8.1.1 During the ten years of Bougainville crisis many youths have missed out on a basic education, and training in appropriate skills necessary to allow them to settle back into a productive existence in the village. This has led to a feeling of alienation in youths and has contributed to the continuing crisis.

8.1.2 This problem urgently needs to be addressed so these youths and young adults have a chance to develop skills and are given opportunities to resettle back into a post crisis society and become useful productive citizens. The future of Bougainville will increasingly rest on the shoulders of the youth of today and an effort is needed to train them now.

8.1.3 It is estimated that 20 to 30 thousand youths are affected so any program needs to be big enough to rapidly train significant numbers of displaced youths in useful skills.

8.1.4 There is provision for traditional vocational or technical schools to reopen and operate, and give training to this group, under the present Department of Bougainville Division of Education program. These include the Tinputz Specialised Training Centre, Buin Vocational Centre, Burunotui Vocational School, Talena Specialised Training Centre, Arawa Technical College, Kubu University Centre, etc.

8.1.5 However, these vocational and technical schools will not be able to cater for the numbers of youths requiring technical training and skills. It therefore requires an approach that will cater for training large numbers in the shortest possible time, and at the same time provide opportunities after training has been completed. It is this new approach²⁰ which is presented in this document.

8.2. Aims and objectives.

- To provide technical training to Bougainvillian youths and improve the skills base of young men and women affected by the ten years of violent crisis in Bougainville.
- To assist in youth rehabilitation and re-socialisation, by training to provide this sector of the community with more skills and make them more useful in a village setting as well as employable with government and private companies involved in the development of Bougainville.
- Encourage self employment by following up training with provision of tools and equipment to enable them to find self employment in their communities in such pursuits as agriculture, including producing cash crops such as cocoa and copra, food crops including vegetables, livestock including pigs and poultry, and fisheries. Building, including building houses,

²⁰ Part of this approach is not strictly new. Prior to the crisis the Department of Commerce set up the Village Industry Research and Training Unit (VIRTU) which was promoting appropriate technology in villages as far back as 1982.

canoes, schools, aid posts and village resource centres, and installing water supplies. Engineering involving basic mechanics for repair of village vehicles and equipment for cooking and sewing enterprises as well as handcrafts.

- Improve the rural economy of Bougainville by increasing participation of youths in economic activity.

8.3 Activities/inputs/timeframe

8.3.1 With the numbers of youths affected and the importance of the problem to Bougainville reconciliation, additional resources need to be planned for and allocated to include as many of them as possible as quickly as possible. An approach needs to be adopted, that will be able to cater for more youths by increasing the number of specialised courses run from vocational schools and providing appropriate technology training in villages.

8.3.2 Because of the complex task of building infrastructure, recruiting skilled managers, developing curriculum, identifying and training suitable instructors and staff for conducting specialised courses, and village **save na mekim** schools, it is planned to introduce the scheme initially in three districts important to the reconciliation process. The programme would be extended to other districts, if and when more funds become available and if it proves successful. The **save na mekim** courses would be extended to areas outside the designated STCs as soon as possible.

8.3.3 Three Districts i.e. Buin, Tinputz and Central, will be assisted with staff and infrastructure to conduct specialised courses from vocational centres and **Save na Mekim** Schools from villages in these three districts. Provincial Headquarters and a Staff Development unit will also be established.

8.3.4 Depending on further funding and staff availability and the success of the programme it would be extended to all districts and villages throughout Bougainville.

8.4 Options for vocational schooling

Traditional Vocational Training

8.4.1 There is a need for traditional district vocational centres known in Bougainville as Specialised Training Centres, (STC) to give long- term training to selected students, some who in turn will become trainers themselves. The traditional two year course with one extra year of supervised village project is still required for grade nine and ten leavers interested in more detailed vocational training. Limitations on student intakes, however, will mean only some youths can attend.

8.4.2 Specialised courses and village **save na mekim** schools, would be supported under the programme which would also give support to the STC in the initial stages until they were fully funded and operational i.e. the practical skills project would assist with resources where

necessary. This will be necessary because of the extremely run down nature of the infrastructure, which has been abandoned for so long and subject to looting and vandalism.

Specialised Courses

8.4.3 Under the project proposal, initially three vocational schools, i.e. STC's at Tinputz, Aropanari²¹ (Central District BRA area) and Buin, will be supported to establish units for conducting short (approximately three month) specialised courses in selected topics.

8.4.4 Specialised course instructors (permanent staff) and technical specialist instructors (temporary staff on an hourly rate) would conduct courses from these training centres.

8.4.5 The planned specialised units built at the STC's, would be able to offer hands on training of students in such subjects as building, agriculture, engineering, home economics, plumbing and water supplies, etc. The STC's will provide valuable resource bases for these specialised courses, with experienced staff, equipment and demonstrations. They will also become training centres for staff recruited to the programme.

8.4.6 The scope for use of these facilities will have to be carefully evaluated in the preparation of project documentation. Whilst the EU Technical Advisor is confident that the designated centres will be able and willing to host the specialised courses, the staff of these centres were more cautious. They seemed to think that the problems of getting the STCs up and running were enough without trying to take on more responsibilities. A clear statement of government policy will need to be made and the centres persuaded to take part. Trained staff could be sent into areas that are not designated for priority development under the EU project.

8.4.7 Initially this project should concentrate on teaching basic agricultural skills, village based skills such as carpentry and plumbing, welding and basic numeracy and literacy skills to young adults. The problem is to ascertain what skills can be taught effectively in a classroom situation in such a short time. It may be a better use of these funds to give much longer courses to trainers who can then impart this knowledge to the youth over a much longer period based in their home villages. The experience at Paruparu where they trained primary school teachers and "barefoot doctors" during the crisis and sent them into all of the BRA controlled villages may well be the best solution to the problem. Also the role of the traditional agricultural extension officer (*didiman*) may need to be expanded to allow for these needs.

8.4.8 The key part of the project design will be a more intensive assessment of the most cost effective and practical method of imparting basic skills to as many people as possible. The mix between classroom and on-the job training will be crucial to the effectiveness of this programme.

²¹ There is some doubt about the ability and willingness of Aropanari to be able to participate in the scheme, this would mean finding another home for the project in the Central district.

9. FINANCIAL INTERVENTIONS AND CONSIDERATIONS

9.1 In almost every discussion with Bougainvilleans or about agricultural rehabilitation the subject of finance comes up. Because the crisis has been going on for nearly ten years there are many people who have had no cash income for that period. Their cash crops and their infrastructure such as fermenteries and dryers are overgrown, destroyed or no longer functional. Many of them require some financial assistance to restore their earning capacity. Paradoxically there are also many people who still have cash savings, which they are using to restore their own infrastructure²².

9.2 The problem will be exacerbated by the fact that most of the materials that are being used are free ex-BCL materials and items are being supplied considerably cheaper than the going market price. People who have to fund repairs later will have to pay the market price which will probably double the cost.

9.3 There are two distinct requirements for financing, the continuation of the present micro credit scheme and credit for larger repairs and cocoa rehabilitation.

Micro Credit.

9.4 The micro credit scheme has been in operation since March 1998 and had an initial allocation of K100, 000. During that time it has provided 148 loans with a total value of K82, 535 at an average value of K569 per loan according to the report supplied by the EU Technical Advisor, a further K7, 901 has been spent on administration of the project. The scheme was not supposed to provide loans in excess of K500/loan and there appears to be a discrepancy in the reporting which does not suggest that any loans for more than K500 were made.

Districts, number and types of projects are summarised below:

Buin	15	Central	20	Siwai	15
Banoni	3	North West	9	Tinputz	23
Buka	43	Oria	1	Wakunai	3
Nissan	15	Torokina	1		

Types of Projects established are:

Bakery	5	Fishing	3	Kerosene	13
Petrol	11	Food	1	Poultry	17
Drink selling	1	Ice blocks	2	Second hand	40
Rice trading	1	Trade Store	37	Vegetables	2
Spear tobacco	1				

²² Rod Meyer, NZVA assisting the Aropanari vocational centre's welding business observed that they could not keep up with demand for kiln pipes from people who "had cash in their hands". The District Manager, Tonu claimed that there were 15 fermenteries operational in his district, repairs of which had been funded by the people.

9.5 Brief discussions on the project revealed that the Bougainville Council of Women (BCW) was pleased with the initial progress of the project. They would like to see at least another K500, 000 allocated to the scheme and to have the upper limit lifted to K5, 000 per loan. Whilst there is probably no need for an increase of that order, the devaluation of the kina has meant that material costs are higher and there may be a good case for an increase to (say) K1, 000, examples of projects that they would like to fund were:

- Guest Houses at K3-5,000
- Rice Mill at K1040
- Deep Freezer at K1, 200
- Second hand clothes at K375 per bale.

9.6 Details of repayments were not available and unconfirmed reports varied from almost 100% repayments and on schedule (Council of Women) to a very poor repayment record (Pers. Com. EU Advisor). A survey carried out by the EU Buka office showed a high proportion of repayments had been started and at least 4 loans have been repaid.

9.7 Problems revealed were mainly administrative, record keeping and reporting systems need to be established to ensure that loans are properly noted. The BCW asked to have an accountant appointed to the project to maintain records and ensure that money was not stolen. There is a need to tighten accounting and administrative procedures. One report suggested that money being repaid from loans was not being adequately accounted for and there was some loss from the receipts which was discouraging other women from repaying their loans. The project document prepared by the EU Technical Advisor allowed for K111, 000 for strengthening of administration. In a project of K500, 000 this seems very high and it is suggested that alternative ways of providing administrative support be investigated.

9.8 Other women's groups believe that the scheme has been too exclusive and that the BCW has not considered other women's groups in the province especially church groups and ex-BRA affiliated groups. It is important that these differences be resolved and that the scheme be open equally to all women in the province.

9.9 A possible way of reducing administrative costs would be to set up a small unit for administering all EU subventions with one person responsible for the micro credit scheme. Ideally this person would be seconded from the BCW to provide longer term continuity to the scheme. Accounting needs should be simple and kept so, support could be provided by the Department of Bougainville or a bi-monthly inspection by a commercial accounting or management firm.

9.10 The project has departed from the Grameen model, which restricts loans to small groups of women who would apply peer group pressure to each other to ensure that loans are repaid. This project has given loans to women from many districts and for varying small enterprises but the women are responsible to repay the loans to the scheme without any direct peer group pressure. The BCW argues that the urgency to get loan funds to women to help get the economy going makes this model more appropriate to present day Bougainville than the

Grameen type model because they cant wait for the loans to be repaid before giving out new loans. There are valid arguments on both sides.

9.11 It has been reported that there are a number of micro credit schemes operating in the province²³.

9.12 This scheme is to be the subject of a separate study to be commissioned by the EU at a later date and these issues will be addressed there. It is important that a clear distinction between micro credit and small business loans is maintained despite the pressure from the BCW and others to increase maximum loan size. The essential feature of a micro loan is its simplicity and low administration cost, once the size of loans increases and the type of project becomes larger and more complex a whole different set of skills are needed to make the business, and therefore the loan, work. These businesses can be considered to have graduated from micro to small businesses and should be the target of agencies responsible for the development of that sector.

Other Credit

9.13 At present, the entire Bougainville province is served by one sub-branch of the PNG Banking Corporation (PNGBC) in Buka, a branch of the Rural Development Bank in Buka, and several micro-credit schemes sponsored by the provincial government, plus several churches and other donors. The PNGBC sub-branch provides normal retail banking services, but is inaccessible (except at considerable cost of time and money) to the majority of the population. The Rural Bank has severe problems, and ceased lending in April 1999. The micro credit schemes are small and not intended to provide loans large enough to enable the reconstruction of agricultural infrastructure and plantings.

9.14 The first EU report envisaged that there would be a different tranche of money available for micro credit apart from the women's scheme²⁴. This was to provide loans for the rebuilding of fermenteries and dryers and could have been substantially repaid after the first batch of produce was processed, allowing the money to be re-loaned to another farmer. The scheme was not implemented and there are no loan facilities for this purpose or the creation of necessary ancillary businesses to support agricultural production.

9.15 It is not possible to place a value on the cost of repairing fermenteries and dryers as there are too many variables including the availability of materials that have been removed from the BCL mine site. The cost of kiln pipes seems to be between K600-2000 depending whether they have been fabricated in Bougainville or Rabaul and transport costs to the site. The cost of repairing/replacing roofs, cocoa wire and structures will be in addition to this so the requirement for a fermentery will be around K2, 000.

²³ UNDP, *Report of the Assessment Mission (Primary Sector)*; (Port Moresby, June 1999), p17

²⁴ Manning M; *Ibid*, p18

9.16 Cost of replanting will vary according to the size of the block, it is assumed that the first 720 seeds/seedlings (enough for 1 hectare)²⁵ will be provided free and thereafter they will be sold at K0.25 per seed and K0.40 per seedling. A 5 hectare cocoa block would therefore cost K1150 for seedlings after receipt of the free seedlings. There will be other costs in getting the block ready for planting which will bring the loan requirement to the vicinity of K2, 000 per farmer. There is a strong debate about the size of holdings and how much seed should be made available and we have assumed that the average farmer/family will want to plant up to 5 hectares.

9.17 The loan requirements will also be different, some farmers are rehabilitating their cocoa and require fermenteries immediately and they should be able to repay loans quickly through cash flow. Replanting and fermentery loans at a later date are of a longer term nature and will have to be looked at separately.

9.18 It has been estimated that there are 1100 fermenteries in Bougainville. Some have been repaired and are already in production. Assume that there are 400 requiring immediate funding at K2, 000 per fermentery the cost would be K800, 000. The challenge is to make this money available quickly with the minimum of administrative cost and procedures whilst ensuring that loans have a reasonable chance of repayment. Because of the urgent need to get economic activity started the security of the loan needs to be of lesser importance. Loans will, in all cases, be in the form of materials rather than cash. Suggested methods of credit for dryers and possibly other needs are²⁶:

1. Lease/Buy-Back

A suitable agency purchases equipment, such as cocoa drier kiln pipes and supplies them to registered cocoa smallholders who make regular repayments. Possible agencies are Cocoa Board and CCEA. Major problem is that neither have any form of leverage to get growers to repay loans and as semi-government agencies growers would not feel any obligation to repay loans.

2. Supply of Dryers by Cocoa Buyers

Buyers/exporters of dry bean would supply materials to growers and deduct repayments from cocoa cheques. Disadvantages are that exporter may not stock plantation supplies, if providing a financial service e.g. a voucher, would require at least cost recovery. It is doubtful that cocoa buyers would agree to this scheme because of the risks involved e.g. grower would not sell cocoa to the buyer he borrowed from, preferring to sell to another and get the full value of the cocoa.

²⁵ The UNDP/CCEA proposal assumes that 1000 seeds will be given to village farmers who do not have easy access to central nurseries to allow for above average losses.

²⁶ UNDP, *Ibid.*, p17

3. Expansion of the Rural Development Bank

Provide specific funding for the Rural Development Bank (RDB) in Bougainville for this purpose. Disadvantages are that Bank already has a bad name, even though loans are small it would require procedures to be in place and often these procedures are so cumbersome that farmers are afraid or unwilling to approach the Bank.

4. Purchase of RDB in Bougainville

This proposal is to buy out the RDB in Bougainville and develop a 'community-owned savings and development institution'. Would incorporate a suitable external agency to help set up the bank and the creation of at least 3 branches in Bougainville. Disadvantages are that this would take time and would not cater for the immediate needs of the farmers who want to get started now. In the longer term the re-establishment of a Savings and Loans Society in Bougainville would cater for the needs, one has been successfully set up again in East New Britain. The Cocoa Board is proposing to set up a Savings and Loans Society but it would only cater for cocoa growers. The major weakness is the time to build up savings before any lending can take place.

5. Establishment for Existing Micro-Finance Projects

'Creation of a new umbrella institution to act as an apex or central bank for the many existing micro-credit projects. This could be established by contracting a suitable external Development Financial Institution (DFI) or NGO to start-up, establish, train staff and then gradually hand over to local management. A community trust type of ownership would be envisaged'. The banking industry is gradually withdrawing from many centres in PNG with one or two exceptions, at the outset this proposal would be very risky. The main advantage of a micro credit scheme is that it is simple, transparent and can react quickly. The main disadvantage is that it is a risky form of credit provision and the provider of seed capital has to be prepared to lose a high proportion of its money. This would make the umbrella proposal risky.

6 Cocoa Smallholders Savings and Loans Society

The Cocoa Board is preparing to introduce an industry based savings and loans society. The most important question is whether a regulatory board should be involved in a financial institution and whether this would be of any use to growers of other crops or cocoa growers who wanted to diversify. It also suffers from the disadvantage that it will take time to build up reserves to enable loans to be made. The need on Bougainville is immediate.

2.19 Whatever solution, the provision of credit will be a costly exercise, records will have to be kept and an assessment of repayment capabilities made, this can quickly lead to administration problems and the creation of a banking type institution which leads to delays in processing the loans. Savings and loans societies seem to be able to avoid this pitfall but it takes time for them to build up capital and for the individual to save enough to be able to make a loan.

9.20 Because it is one of the most urgent needs to get income into the hands of the farmers we recommend that a "one-off" grant of K2, 000 worth of materials be made to each farmer who can prove he/she had a registered fermentery or a functioning copra dryer in the project area before the crisis. This could be administered by district authorities and allocated on a first-come, first served basis. An amount of K800, 000 could be allocated to rebuild 400 fermenteries and copra dryers, to be allocated evenly amongst four districts.

9.21 There is no easy solution to this problem. **The UNDP report suggests that a one-day multi-agency workshop be held in Arawa or Buka to find a solution to the problem. It is suggested that the EU could take a lead in this immediately, as it is so important to the long and short-term future of agriculture. In addition, the studies resulting from this report should include a listing of, and an analysis of all credit sources available within the province.**

9.22 The existence of several pyramid-banking schemes in Bougainville will make the establishment of any new credit agency very difficult in the near future.

10. RECOMMENDATIONS

10.1 Logical Framework

INTERVENTION LOGIC		OBJECTIVELY VERIFIABLE INDICATORS		SOURCES OF VERIFICATION	ASSUMPTIONS
OVERALL OBJECTIVES	To increase village level economic activity within Bougainville Province.	Increased coco and copra output	Economic Statistics from National Statistics Office and Provincial Surveys	Political stability and transport availability	
PROJECT PURPOSES	- To increase smallholder agriculture through rehabilitation of existing cocoa and copra plantings and replanting of cocoa and coconut stands destroyed through neglect and/or fighting. - To ensure that the rehabilitation project is sustainable by integrating it into the provincial programme - To facilitate marketing through upgrading the feeder road system. - To provide credit facilities for smallholder producers and service providers, such as transport, farm inputs, etc	Project Coordinator appointed Rice being grown and processed in the villages Produce being delivered to shipping points at Kunua, Torokina, Mamagota and Marau. Bridge and causeway completed Project Implementation Document and detailed annual programmes put together and approved by the province and the Stabex committee. Plans integrated with the provincial programme Seed and/or seedlings distributed Farmers planting cocoa and coconuts. Trainees that have attended courses Fermentaries reconstructed Roads repaired Loans available to a number of farmers and service providers	Cocoa Board and Copra Marketing Board Statistics Health and Nutrition surveys. CCRI and CCEA returns. Lending returns from CoEs.	Provincial stability and transport availability	
RESULTS	- Cocoa and copra produced in the targeted districts - Feeder roads restored to a state where agricultural produce can be transported to points of sale - Lending agencies operating in the main centres of Bougainville - Farmers and Extension Officers trained/retrained	Cocoa and copra planted and managed – cocoa production increased by 0.5 tonne per farmer and copra increased by 1 tonne per farmer, ie 1,700 tonnes of cocoa and 3400 tonnes copra by 2004. Kilometres of road repaired, ie 694km in total by 2002. 100 loans issued Extension officers and 3400 farmers trained.	Marketing statistics. Reports Field verification Reports from District Health and Agricultural Officers Receipts for purchase and delivery documentation. Reports from the provincial DOW. Monthly progress reports to Stabex SC and regular external monitoring Invoices from suppliers	Provincial government support and participation. CCEA has the ability to carry out the work. DOW capable of supervising road repairs. Willingness of farmers to accept training and re-enter the economy.	

ACTIVITIES	1. SHORT TERM - IMMEDIATE INTERVENTIONS Provide a number of immediate material inputs and participate in the process of integrating medium and long-term inputs into the provincial planning process.			
	1.1 Appoint a Project Coordinator to facilitate a number of immediate inputs.		K205,000 plus the cost of the Coordinator..	
	1.2 Assist Subsistence Food Producers through: ♦ Provision of rice seed to all Districts ♦ Purchase and supply of hand operated rice mills to all districts1.		K39,400	
	1.3 Arrange purchase and delivery of tractors and trailers to Torokina and Kunua.		Cost: K250,000	
	1.4 Carry out urgent repairs on: ♦ Bridge at Torokina ♦ Causeway at Kunua		K100,000	

	MEDIUM – LONG TERM INTERVENTIONS Provide a number of integrated inputs to assist cash cropping through rehabilitation of cocoa and copra production.			
	2.1 Project Management: Establish Project Management Arrangements consisting of • Project Coordinator • Project Clerk • Assistance with project accounting. • Short Term inputs to supervise and evaluate road rehabilitation and maintenance, cocoa and coconut seed distribution and garden maintenance, agricultural and skills training and equipment repairs and maintenance		K205,000 plus the cost of the Coordinator	
	2.2 Integration & Sustainability: Assist with and participate in Provincial Planning to ensure the project components are integrated into the annual budget and provision is made for ongoing maintenance.			
	2.3 Cocoa & Coconuts: Fund the CCEA programme in four (4) Districts, Siwai, Buin, Wakunai and Arawa/Central, as follows: • Provide salaries, transport and operation expenses for extension staff in the four districts • Fund refresher courses for extension staff		K3,428,000	

	◆ Purchase cocoa seed at the rate of 1000 per farmer per district ◆ Purchase coconut seed at the rate of 200 per interested farmer ◆ Establish nurseries at appropriate locations ◆ Arrange for seed (plus planting bags) and/or seedling distribution			
	2.4 Fermentaries: Rebuild 100 fermentaries in each of four (4) Districts, through provision of kiln pipes and/or drier beds, estimated at K2,000 each.		K800,000	No other agency funding this component. Materials and supplies are available. Skills training provided for selected farmers.
	2.5 Feeder Roads: Repair and/or reconstruct priority feeder roads in four (4) Districts, based on current and potential cocoa and copra production.		K6.5 million	
	2.6 Credit: Support banks and lending agencies in the delivery of credit to entrepreneurs and/or farmers organisations, through subsidized interest rates or other appropriate means.		K200,000	

10.2 Rationale

10.2.1 We have concluded that there are a number of cost effective ways that the European Union can and should assist agricultural redevelopment on Bougainville. We recommend that the assistance be viewed in two separate phases, an immediate intervention and the longer term project to be carried out over a period of three years.

10.2.2 We do not agree with the approach taken by the CCEA and supported by the UNDP. The cost of rehabilitating all of the cocoa in Bougainville as well as providing feeder roads and training would be far in excess of funds available under the proposed Stabex intervention of approximately K13 million (5m Euros). We recommend that this money would be better used by some small and immediate assistance which will have an impact and selection of a number of areas for intensive rehabilitation.

10.2.3 We believe that the CCEA/UNDP approach of supplying at least 720 cocoa seeds to each farmer in Bougainville is fundamentally flawed. There is no point in supplying farmers with seeds for cash crops unless they can reasonably expect to be able to get the resultant produce to market. To do this all the feeder roads on Bougainville would need to be restored as well as wharves and their own infrastructure. There is approximately 1200 kms of feeder road needing repair. On average we believe that this will cost K14, 000 per km to repair or a total of K16, 800, 000 which is more than the amount available to the project.

10.2.4 We have therefore attempted to select the districts that are more suited to cocoa growing and which should be given priority in this project.

10.3 Immediate Assistance

Technical Advisor

10.3.1 There is an urgent need to replace the outgoing Technical Advisor/Co-ordinator (TA). There are a number of agencies working on agriculture in the field in Bougainville. We observed that there were signs that some of them were not very well co-ordinated e. g confusion between ADRA and CCEA at Tinputz. All agencies we were able to meet expect that the EU will take the lead role in assistance in the agricultural arena and this would be a very useful thing to do. The work of the previous TA has been well appreciated and brought credit to the EU.

10.3.2 In order that the co-ordinating role is effective it is important that it is situated in the office of a senior officer in the department of Bougainville. The outgoing TA was situated in the Department of Primary Industry and worked closely with the Assistant Secretary. It may be necessary to move the position to the office of The Administrator to ensure that there is enough authority to bring agencies together.

Integration of Funding

10.3.4 It is very important that the Department of Bougainville be fully involved in the planning and execution of these projects. It will be essential that on-going expenditure is

committed by the Department to ensure that rehabilitated assets are then maintained if the project is to have a lasting effect.

10.3.5 In order that the Department is fully involved, and understands the long term financial commitment that this project will entail, it is recommended that the entire project be funded through the provincial budget. This can be done in much the same way that overseas aid is treated in the national Budget but on-going maintenance needs should be spelt out at the outset.

Rice Mills

10.3.6 During the crisis there has been a resurgence in rice growing. This is virtually all grown for domestic consumption, although we met one farmer who produced a surplus for sale. In practically all districts, particularly in South Bougainville, leaders requested rice mills. The rice is currently hand threshed and milled with a variety of implements to grind the husk off.

10.3.7 It was reported in Tonu that a mechanical rice mill had been unserviceable since 1994 due to lack of spare parts. All districts agreed that small hand mills would be suitable and very useful. This may also encourage the expansion of rice growing, particularly as the price of imported rice rises due to the devalued currency.

10.3.8 A small hand mill costs K788 ex Port Moresby and we estimate that there should be 5 mills provided for each district. This brings the total cost to K39,400 plus delivery costs.

10.3.9 It is recommended that new rice seed be introduced to avoid declining yields from over use of existing varieties. Rice seed is available free for the Republic of China (Taiwan) rice project based in Lae

Tractors and Trailers

10.3.10 It is not recommended that the intensive rehabilitation programme be carried out at either Kunua or Torokina. Both of these districts have an urgent need for transport to get produce to the wharf to enable it to be marketed. In both of these districts provision of a tractor and trailer would considerably increase the amount of produce getting to point of shipping, especially at Kunua where the walk to the beach is several kilometres.

10.3.11 Project 1.6E Bougainville Port Infrastructure Project under the Framework of Mutual Obligations (FMO)-Satbex Transfer Years 1992/93/94 makes provision for tractors and trailers to be supplied at Kunua, Torokina, Marau and Mamagota. We support this proposal although we did not have time to visit Mamagota or Marau²⁷. The cost of 4 tractors and trailers would be approximately K240,000 (ex Lae) plus freight.

Bridge

10.3.12 At Torokina the bridge/causeway over the river has collapsed and is now unpassable. This means that farmers on the north-eastern side of Torokina station will not gain

²⁷ Sovele villagers mentioned the urgent need to upgrade Marau wharf and provide transport to it.

the same benefit from the tractor and trailer. They will have to continue to carry their produce by hand up to and across the river. It is recommended that the bridge be repaired at an estimated cost of K70-100, 000. .

10.4 Crops

10.4.1 The original Terms of Reference for this study required the consultant to look at a range of crops as well as livestock. These have been covered in some detail in section 6 of this report. We consider that the consideration of all of these crops in such a modest intervention would result in dissipation of effort to a degree that the results would become insignificant and reduce the impact.

10.4.2 We recommend that this intervention be confined to the items listed above, plus cocoa and coconuts, feeder roads and necessary training in four selected districts.

10.5 Integration

10.5.1 Based on the project dossiers prepared by the TA we have stressed in all of our meetings with Bougainvilleans that the project will be an integrated one. Our approach is that there has to be cash crops to warrant roads, there has to be training to assist in the growing of the cash crops and in some instances there has to be credit to assist the farmers to plant their crops and resurrect their infrastructure.

10.5.2 The need for integration has also meant that we have restricted the number of districts to be looked at. We have taken the view that it is better to concentrate resources in a few areas which have the potential to create some real wealth rather than spread it very thinly over a number of districts. The President of the Bougainville Representative Congress indicated that he was happy with this approach²⁸.

10.6 Project Management Unit

10.6.1 It is recommended that the Project Implementation Unit be kept to a minimum level and that a staff of two officers be appointed to the unit. This would include a project co-ordinator, assisted by an accounts clerk. The co-ordinator will ensure that funds are disbursed to implementing agencies and monitor physical progress of the short and medium interventions. Further supervision and monitoring, if necessary, could be carried out by an accounting firm, an agricultural firm and an engineering firm on a regular fly-in, fly-out basis.

10.6.2 The Project Management Unit will require orientation on procedures used to acquit funds by the EU. Duty Statements for staff of the PMU are attached as Appendix 5.

10.6.3 The co-ordinator's salary and conditions will be the subject of negotiation with EU and Stabex Steering Committee. The clerk will cost approximately K20, 000 and a typist/receptionist around K10, 000. At least K50, 000 should be allowed for office expenditure and running costs depending on whether the office is located within the Department of Buka. A

²⁸ Joseph Kabui pers comm, 21 July 1999

further K100, 000 should be allowed for transport, accommodation and inspections for the PMU, with K25, 000 allowed for short term assistance and monitoring. Total cost K205, 000 plus the cost of the Coordinator.

10.7 Cocoa and Coconut Extension Agency Project

10.7.1 The CCEA has an ambitious project to provide at least 720 cocoa seeds or seedlings to every cocoa farmer in Bougainville. It is outside the scope of this report to cost this exercise accurately. Nevertheless, assuming the cost of K0.81 per seedling²⁹, supply of 12, 000, 000 trees would cost about K9.7 million. To fully service all of these farmers would require rehabilitating all of the 1200 kms of feeder roads at a cost of approximately K14, 000/km or K16,800,000 (and this would probably not service all farmers.)

10.7.2 We believe that it would be pointless for the EU to fund this large scale and universal project. The logistics of getting seeds to farmers in remote locations is very hard and already there have been significant losses from failure to properly co-ordinate delivery of seed and planting bags³⁰. More importantly there is no point in encouraging farmers to plant cash crops if they are not able to get the produce to market due to lack of road or sea transport.

10.7.3 We recommend that this project concentrate on the following districts, **Siwai, Buin, Wakunai and Arawa/Central**. We have not considered Buka or the Atolls, and rank the remaining districts in the following order Sovele, Tinputz, Selau-Suir, Kunua, Torokina. The main criteria we have used were land suitability and numbers of farmers in each district. Production figures for each district are not available from the Department of Agriculture or the Cocoa Board even though the latter should be able to extract the information from registered fermentery numbers.

10.7.4 The CCEA carried out a census of cocoa and coconut trees in Bougainville between February and March 1999. Table 10 gives an indication of which districts have the greatest density of farmers. The four selected districts rank the highest.

10.7.5 Based on these figures and allowing K1 per seed, the cost of providing 1000 seeds per farmer would be in the vicinity of K3,428,000. The annual benefit of having 1976 farmers with one hectare of cocoa yielding .5 tonne/ha would be about K2, 000, 000. There will also have to be provision for nurseries for farmers who wish to plant more than 1 hectare. These would be run on a commercial basis and will require adequate provision of credit where farmers do not have the resources to fund the additional purchases.

²⁹ The TA estimated that 2,590, 000 seeds would cost K2, 102 to plant, including staff costs, material costs and capital costs. This has been used purely to give an order of magnitude.

³⁰ We were informed that a large number of seeds were supplied to Torokina without planting bags, they were planted directly into the ground and most of them were lost.

Table 10: Farmers per District

District	Total Village per District	No. of Villages Selected	Total Farmer Population for Selected Village	Percentage of Total
Buka	45	6	441	13
Buin	107	14	620	18
Kieta (Arawa/Central)	78	10	415	12
Torokina	45	10	127	4
Kunua	47	6	234	7
Siwai	74	7	598	17
Wakunai	32	10	343	10
Tinputz	39	4	211	6
Selau-Suir	28	5	198	6
Bana (Sovele)	48	5	211	6
Nissan	17	2	30	1
TOTAL	560	73	3428	100

Source: Cocoa and Coconut Extension Agency; *Bougainville cocoa and Coconut Census Report*; (Madang, 1999), p3

Note: The boundaries for Kieta and Bana may not coincide exactly with the current boundaries as these have not been accurately mapped.

10.8 Feeder Roads

10.8.1 We believe that feeder roads have to go hand-in-hand with cocoa and coconut development. There is no point encouraging farmers to plant cash crops if they are not able to market their produce easily. In times of good prices farmers a bigger effort to secure markets but when prices get low they will no longer want to carry crops long distances to the nearest point of access.

10.8.2 The detailed studies proposed will require traversing every feeder road in each district and assessing the cost of repairs and maintenance. At the same time existing and potential agricultural land needs to be identified. Roads will have to be prioritised on the basis of cost effectiveness and those which serve larger areas of suitable land will be given preference to those that serve smaller areas.

10.8.3 It is estimated that there are 694 km of feeder roads in the four districts (p43) and the cost of restoring all of them would be in the vicinity of K10 million. It will be necessary to prioritise roads within the districts. Assuming half of the proposed intervention will be spent on feeder roads this would cost in the vicinity of K6.5 million and provide about 460 km of roads.

10.9 Vocational Training

10.9.1 The project dossier talked about running many short courses at fixed locations on subjects related to village life as well as basic numeracy and literacy. We do not agree with this approach. We believe that the courses would be too short to be of any use to students who have not had access to education for such a long time. There will be problems in getting them in to the schools, in getting them used to a classroom situation and accepting the basic disciplines of education. All of these will require very specialised teaching skills and patience.

10.9.2 We believe that the education function should be carried out as much as possible in the home environment and the Parparu experiment may have more merit than the model proposed by the TA. In this model instructors would be trained at the vocational centres with the skills needed to enable them to train the youth in the villages. The Training expert in the project preparation team will need to make a final assessment of the type of intervention that is best suited to the conditions on Bougainville and the best location of necessary infrastructure.

10.9.3 It may be important for political reasons to situate one of these centres in Tinputz because it has not been recommended for other development and the training centre does not have to be in the same district as the cocoa and feeder road development.

10.9.4 The correct mix of classroom and practical training will be addressed by the training expert in the project design team. We recommend that double classrooms be built at Tinputz, Mabiri and Buin. These classrooms should be built using the "Laloki" model of appropriate technology using local youth to erect the buildings and in turn receive training in building skills which they can pass on to others in their home areas. The cost will be approximately K150, 000..

10.10 Fermenteries

10.10.1 It appears that there are about 1200 fermenteries requiring urgent repairs. All of them require replacement of kiln pipes and most require major repairs to buildings, fermentery boxes and/or drier beds. It was impossible to get an accurate cost of repairs, with estimates for kiln pipes ranged from K180 per length ex Rabaul to K600-1200 per length delivered on site.

10.10.2 This is one of the most urgent short and longer term needs. For Arawa and South Bougainville the cost of kiln pipe has been substantially reduced by the Aropinari Vocational Centre which has, up until now, been able to "salvage" steel plate from the BCL mine. They have been able to keep prices low because of that but they will soon have to buy in plate at world prices and the cost of pipes will probably double.

10.10.3 There have been a number of suggestions made regarding the provision of pipes. These range from providing credit, so that farmers can carry out their own repairs, to providing selected growers with free pipes to get processing started.

10.10.4 The EU/Stabex Steering Committee will have to make an in-principle decision on this issue. We recommend that K2, 000 worth of materials be given to farmers as a "one off" grant in the districts that have previously had registered fermenteries³¹. This will cost in the vicinity of K800, 000, assuming 100 fermenteries per district.

10.10.5 We believe that AusAID are interested in providing funding for this component of the overall assistance programme to agriculture and it would be appropriate to pass funding for the remainder of Bougainville to them.

³¹ Since this report was begun AusAID has sent a mission to Bougainville to look at the provision of fermenteries and this area should be left to them, allowing the EU to concentrate on other aspects of rehabilitation.

10.11 Credit

10.11.1 The future of the EU micro credit scheme in Bougainville will be the subject of a separate study which has already been commissioned.

10.11.2 There will still remain a need for credit for farmers. In the long run this will be a problem that will have to be addressed by the governments of Bougainville and PNG. In the short term there is only one commercial banking agency in Buka and a branch of the Rural Development Bank. This makes it very difficult for ordinary folk to access any form of credit or make repayments to loans.

10.11.3 There is an urgent need for finance to be made available. Bougainvilleans repeatedly stressed that they did not want handouts, they simply wanted to get access to some funds so they could restore their businesses, gardens and processing facilities. The previous **Paconsult** report suggested that an informal credit scheme be operated along the lines of the micro credit scheme and allocated through the COE process. Loans would not be more than K2, 000 and a certain allocation say K50, 000 would be made to each district for this purpose. The total cost is estimated at K200,000.

10.11.4 The scheme would only be able to give credits for agricultural materials, seeds, fermentery drier parts, etc. No additional funds would be made available and the district would be responsible to get loans repaid in order that new loans could be made. It should be accepted that this would be extremely high risk finance and that no administration officer, didiman or public servants should be used as debt collectors.

10.12 Terms of Reference

10.12.1 The Consultants shall design a project to cover the rehabilitation of cocoa and copra in the Wakunai, Arawa/Central, Buin and Siwai/Sovele. This project will be an integrated rehabilitation of crops, public and private infrastructure and skills.

10.12.2 The consultant will report on the optimum size of cocoa intervention in these districts and how to distribute planting material. Considering previous reports and present CCEA/UNDP/AusAID practices he will recommend on the mix of free planting material and the amount, availability and provision of material at commercial rates.

10.12.3 The consultant will identify the most suitable areas for development of cocoa and copra and will provide detailed design and cost estimates for the rehabilitation of feeder roads which will allow the produce to get to market or to a transshipment point. Roads are to be restored to an acceptable standard. Where possible labour intensive methods of road repair will be used and local contractors will be used.

10.12.4 The consultant shall identify the cheapest and most effective method of providing essential infrastructure to farmers. He will make recommendations on provision of kiln pipe, building materials and cocoa and copra wire for reconstruction of cocoa fermenteries and dryers as well as rebuilding of copra dryers. He shall make recommendations about the most effective method of providing finance for this rehabilitation including a mix of commercial and grant funding. He will also report on the mechanism to be used for the provision of credit and methods of collecting loan repayments.

10.12.5 The consultant will report on the best way of providing training and agriculturally related education to youth in these regions as well as the rest of Bougainville. He will be required to recommend the right mix between formal classroom training and on the job training in the village. In doing so he will be mindful of the project prepared by the EU technical Advisor about the need for skills other than those directly related to agriculture and whether a small subvention such as this one should aim to provide anything other than agricultural training. He should report on the proposal to place classrooms at Tinputz, Mabiri and Buin and whether they will provide best value for money in training needs.

10.13 Estimated Cost of Project Design

Table 11: Estimated cost of the detailed project design

Item	Days	Cost	Kina
Team Leader/Land Use/Agriculturalist	19	\$A600	22800
Feeder Roads/Infrastructure Expert	14	\$US360	14903
Training Expert	7	K400	2800
Accommodation	40	K130	5200
Airfares		K800	3600
Insurance		K2000	2000
Report Preparation			2000
Motor Vehicle hire	10	200	2000
Contingency 10%			5000
TOTAL			60303

Appendix 1 – TERMS OF REFERENCE FOR BOUGAINVILLE REHABILITATION PROGRAMME

Presentation of Paconsult

- Organisation
- Approach
- Personnel

**Prepared for:
The Stabex Steering Committee**

**By
Paconsult Ltd
PO Box 1530,
Port Moresby, NCD
Papua New Guinea
3211045
Fax: 3217223
Email: inapng@daltron.com.pg**

(A) THE ORGANISATION

1. Management Capacity

Paconsult Pty Ltd, a PNG registered consultancy company, submits this proposal at the request of the Stabex Steering Committee (SSC), Foreign Aid Management Division, Department of Treasury and Planning. Paconsult specializes in the delivery of carefully planned project designs and has more than 5 years of successfully executed projects in Papua New Guinea. Amongst the agencies that have used the services of Paconsult we are pleased to list the European Union (EU), the United Nations Development Programme (UNDP), the Investment Promotion Authority (IPA), the Public Officers Superannuation Fund Board (POSFB), Garumut Enterprises Pty Ltd, the Overseas Economic Cooperation Fund (OECF) of Japan, Conzinc Riotinto of Australia (CRA) and the Office of Rural Development.

1.1 Technical and Administrative Support

Paconsult will provide project support from Port Moresby. A management team of well-qualified and experienced personnel will liaise with the Stabex Steering Committee and undertake administrative, supervisory and financial functions. Profiles of the nominated personnel are listed below.

The Project Director, Mr Mike Manning, is based in Port Moresby. Mr Manning has more than 25 years of work experience in Papua New Guinea in a number of organisations, both in the public and private sectors. He is a Papua New Guinea citizen and is currently Director of the Institute of National Affairs. More details of Mike's experience are included in the Personnel Section of this proposal.

A strong project management team will assist Mr Manning. Project administration

and support will be provided by Mrs Relly Manning who has more than 20 years experience in office management and public administration, while accounting functions will be the responsibility of Mrs Mitase Chauka.

1.2 Experience

Paconsult Pty Ltd has managed and implemented several project focussed on rural development and environmental protection. In 1995 Paconsult undertook a preliminary study of the status of agriculture on Bougainville and recommended a course of action to restore the island to its pre-1990 levels of production, at which time almost half of PNG's cocoa and copra exports came from the province. This study represented the first comprehensive evaluation of the condition of both smallholder and plantation cocoa since the crisis in 1989 and was the first indication that assistance might be forthcoming to rehabilitate the crops.

Other projects carried out by Paconsult include a comprehensive study of the potential for investing in agricultural developments on large-scale. This study, which was commissioned by POSFB, identified several areas with extensive potential for cash cropping. On behalf of OECF Paconsult investigated the economic potential made accessible through road improvement in the Mumeng/Bulolo area of Morobe and the Rigo and Bereina areas of Central Province. Agricultural, health and educational projects were designed and costed for subsequent funding.

1.3 Fundamental Principles and Objectives underlying the Bougainville Restoration Programme.

The basic premise is that the political situation on Bougainville and Buka Islands

is sufficiently stable to commence restoration of agriculture and that it is only through re-establishing the cash economy of the province that continued conflict would be avoided. The objective, therefore, is to identify a number of discrete interventions that are capable of providing the catalyst to development at village and local community level. The European Union, through the Stabex Programme has committed a sum of 5 million ECU's to fund a number of developments.

Accurate information on the current status of subsistence agriculture plus cocoa and other cash crops combined with an assessment of the potential for rehabilitation is required to enable detailed budgets to be drawn up. At the same time it will be necessary to evaluate the extent and condition of all feeder roads and prioritise a reconstruction programme. Concurrently, it will be necessary to identify the current skill base at village and local community level and design programmes for providing the necessary training to facilitate on-going development. Sources and methods of delivery credit will be reviewed and appropriate systems designed for village level implementation.

These objectives will be addressed by carrying out four separate but interrelated projects, which will be implemented concurrently and drawn together in a final report. The four projects are:

- I. Agricultural Rehabilitation
- II. Feeder Road rehabilitation
- III. Practical Skills Training
- IV. Evaluation and Design of Micro-Credit

In order to assist with scheduling of inputs to each of these development programmes a 'critical path analysis' will be undertaken and presented to the funding agency.

1.4 Proactive Management

In order to ensure coordination and balancing of inputs between all four development programmes the Team Leader will share his time between all four project teams. The Team Leader will provide regular report to the Stabex Steering Committee and establish avenues for active interaction between the committee and the individual teams. This will facilitate regular input and reduce time between submission of a draft report and the final report.

(B) APPROACH

2. Methodology and Workplan

The consultant's approach to each Project is based on a commitment **to ensure that the funding agency is provided with a number of discrete and manageable components for funding** which are designed to support comprehensive development programmes in selected areas. This commitment is supported by detailed knowledge of the PNG political and cultural environment and team experience gained over many years of involvement with project design and implementation in the country.

2.1 Bougainville and its Environs

Bougainville and Buka Islands form a single landmass separated from one another by a shallow, kilometer-wide strait. The total land area is approximately 9,000 square kilometers with almost half the land area comprised of hills and mountains. There are several active and dormant or inactive volcanoes in a geologically ancient plateau of uplifted coral limestone.

The province is fortunate to have some of the best agricultural land in Papua New Guinea. It has a wet tropical climate with mean annual temperature at sea level of around 26.7⁰ C and average annual rainfall

of between 2,700 and 3,500mm being slightly higher in the south than the north.

In late 1989 and early 1990 agriculture on Bougainville came to virtual standstill as a result of the political crisis. For the next seven years or so there was no upkeep of the extensive plantations and smallholder agriculture, no pruning of trees, no road maintenance and more frequently the existing infrastructure was carelessly destroyed. Following Mr Manning's investigation in 1995 EU and AusAID funded a co-ordinator of inputs for rehabilitation of the agriculture sector. This has resulted in a modest rejuvenation of copra and cocoa harvesting. The renewal of interest in rural development as well as an additional commitment from the European Union in the form of Stabex funding has prompted this series of projects.

2.2 Description of the Projects

The programme has four distinct but interrelated projects:

- Agricultural Rehabilitation
- Feeder Road Reconstruction
- Practical Skills Training
- Micro Credit

It is understood that the Stabex Steering Committee requires a number of carefully planned and costed projects for immediate implementation.

In the opinion of the consultants the project should be looked at as a two-stage proposal. There should be a Rapid Rural Appraisal carried out in each district and this should be followed by the detailed preparation of a number of project documents, which are ready for immediate implementation.

2.2.1 Rapid Rural Appraisal

Phase 1 will constitute a mini-project involving a small team which will visit the province for the purpose of refining the areas to be considered. In view of the need for widespread consultation and the somewhat sensitive political situation we believe the rapid evaluation is essential.

The RRA will entail visiting all districts, consultation with the relevant officials, inspection of as much of the infrastructure and agricultural land as possible (by road and helicopter) and making an appraisal of what is currently there and what can be done. This will also have to rely heavily on past records and work done by other agencies since the crisis has ended.

These project documents should follow as closely as possible to the terms of reference but it should be noted that there would be approximately 4500 kms of road to be traversed and the average speed of travel in Bougainville is approximately 15 kms/hr. This alone would take approximately 24 days of non-stop travelling **assuming the all the roads are passable.** At least double that time would be required to walk the roads that are no longer usable. **It is not feasible to make an assessment of every road and the RRA will provide an indication of the areas that should be concentrated on to get the quickest and best results.**

The RRA will identify projects and project areas that can be implemented within each administrative district. These will include recommendations about suitable agricultural interventions covering cash crops, food crops and livestock; the necessary infrastructure to facilitate the agricultural production and training needs for individual farmers, extension officers and the vocational and practical needs of the community as a whole.

It will also cover the mix of grant, assistance in kind and credit that will be best suited to the restoration of agricultural production.

It is proposed to field a small team of experienced persons to carry out the RRA over a ten-day period.

This team will spend two days in Buka with the provincial authorities and then travel around Bougainville, time permitting a visit will also be made to Nissan Island.

It is proposed that the RRA team should consist of the Team Leader, Mr Mike Manning, the Land Use Planner, Mr David Freyne and the Road Engineer, Mr Ian Stevenson. It will be supported by the European Technical Assistance Co-ordinator for Bougainville Mr. Trevor Clark who accompany the team during this study.

In order to achieve the desired result and within the proposed short time frame it will be essential that the RRA team have the maximum mobility. Movement between and within districts will require access to an helicopter. Although the use of helicopter is relatively expensive it is the only possible means of attaining the degree of mobility required to achieve the desired results within a reasonable timeframe.

Phase 2 of the project will entail detailed design of selected projects within a programme spread over some three months, each design drawing on experience gained during the earlier stages. For each district it is proposed to design complimentary projects within the three categories, agricultural rehabilitation, feeder road improvement and vocational training.

2.3 Data Collection and Processing

The procedure to be adopted for the RRA will involve collection and evaluation of all

existing written information, detailed field inspection of the project sites and finally consultation with the widest group of people available. This will give the consultants an up-to-date insight into the situation in all three districts of Bougainville Island and enable them to rank potential investment opportunities on economic and social grounds.

Concurrently, the Micro Credit team will engage in a detailed investigation of the existing credit scheme operating in the province. Banks and other lending agencies will be asked to provide generalised evaluations of repayment records from the various categories of lenders, individuals, co-operative groups, women's groups, etc. This will ensure the team has up to date information on which to base their recommendations.

2.5 Consultation

At all stages of the project the team will maintain close consultation with the Stabex Steering Committee, the Office of Bougainville Affairs (OBA), the EU-TA and other relevant government bodies.

It will also consult with all International donors and NGO's currently operating on Bougainville to ensure that this proposal is compatible with their work.

2.6 Timing

Due to the availability of staff the RRA is projected to start on 13 July and the report to be

Presented by the end of that month. Detailed planning would start as soon as possible after the Stabex Steering Committee has approved the second stage proposals.

(C) PERSONNEL

3. The Team

The success of this project will largely depend on the flexibility of the team, their knowledge of the natural resources and agricultural potential of Bougainville and the ability of individual members to assess the aspirations of the local people. To this end we have assembled a highly competent and experienced team of people for the project.

The **RRA team** all have previous experience in Bougainville and are familiar with the agricultural potential as well as the complexity of political and political relationships. They will have briefed themselves on all available material before they go into the field. It is proposed that Mr. Trevor Clark, the European Union agricultural specialist would accompany the RRA team, provide advice and make necessary arrangements to see the relevant people in Buka and throughout the rest of Bougainville.

It is also important that the **project team** has balance in both gender and ethnicity. This we have achieved by the inclusion of four Papua New Guinea citizens, two of whom are Bougainvilleans, plus two females to address the sensitive areas of women's affairs and micro credit.

Between them the team members have more than 120 years of work experience in Papua New Guinea.

3.2 Team Leader – Mr Mike Manning

Mr Mike Manning, a naturalised citizen of Papua New Guinea, is an economist by training and has been in the country since 1975. During this time he has held senior positions in the public service and in private enterprise organisations. Over a period of more than 24 years he has been involved in provincial government financial management and rural project design and implementation.

Mike Manning has an in-depth knowledge of the cocoa and copra industries and was the manager of one of the primary groups engaged in cocoa production on the Gazelle Peninsula for 13 years. His knowledge and understanding of the situation in Bougainville is extensive. In 1995 he undertook a study of the agricultural situation on behalf of the Department of Agriculture and Livestock, with funding provided by the EU.

The resultant report forms the basis of redevelopment activities since that time. He has also a strong background in agricultural research having been a former Deputy Chairman of the PNG Cocoa and Coconut research institute.

He will be responsible for providing all economic inputs for the project and supervising the completion of all projects.

Appendix 2 - ITINERARY

13 July

Port Moresby-Buka-aircraft delayed 5 hours, Stevenson off-loaded Rabaul
Manning and Freyne arrive in Buka.

14 July

Stevenson arrived Buka

Francis Kabano-Administrator, Buka
Joseph Kabui-President, BPC-Buka
Onavui, David, Co-Administrator, Bougainville-Buka
Patrick Koles, Assistant Secretary DPI-Buka
Bougainville Council of Women-Buka
Buka-Tinputz-Wakunai by road

15 July

Wakunai-Mabiri-Aropanari-Arawa

16 July

Arawa-Oria-Buin-Arawa

17 July

Arawa-Tonu-Sevelle-Buka

18-19 July

Buka-road and agricultural inspection
Write-up

20 July

Buka-Paruparu-Torokina-Kunua-Buka

21 July

Buka
Interviews

22 July

Buka-debriefing
Depart Buka

Appendix 3 - PERSONS CONSULTED

Port Moresby

Agirre, Inaki, European Union
Barker, Paul, Department of Prime Minister
Constable, Paul, European Union
Feraris, Bob, AusAid
Hansen, Barry, UNDP
Meehan, John, European Union
Reid, Elizabeth, Country Representative, UNDP
Rey, Juan Carlos, Delegate to the European Union
Rezzulo, Richard, UNDP
Salum, Uron, Cocoa and Coconut Extension Agency
Sanja, John, Office of Bougainville Affairs
Sorgenicht, Jorg, European Union
Szamier, Margot, Office of Bougainville Affairs
Terry, Fred, UNDP
Westcott, John, AusAid
Wilson, Bob, Office of Bougainville Affairs

Buka

Itemai, Simeon, Provincial Works Manager
Jaintong, Theresa, President, BCW
Kabano, Francis, Administrative Secretary, Department of Bougainville
Kabui, Joseph, President, Bougainville People's Congress,
Kinani, Albert, Assistant Secretary, Commerce
Kolan John, Provincial Works Co-ordinator
Koles, Patrick, Assistant Secretary, Division of Primary Industry
Kurika, Louis, Kubu Research Station
Meura, Pamela, Executive Officer, BCW
Onavui, David, Co-Administrator, Department of Bougainville
Punus, Helen, Kubu Research Station, CCRI
Reben, Betty, Vice President, BCW
Remi, Jacob, Aid Co-ordinator, Planning Office, Department of Bougainville
Robson, John, Affective Services LTD
Sawai, Elizabeth, Treasurer, BCW
Simonelli, Tony, Advisor, Department of Bougainville
Taravaru, Reitana, Assistant District Officer
Tousala, Marrianna, Church Representative, BCW
Tup, David, Assistant Engineer, Technical Services Division
Tseraha, Lesley, Senior Social Planner, Department of Bougainville
Uremu, Mathew, Provincial Extension Manager, CCEA

Tinputz

Buboi, Joe, Manager, Tinputz Special Training Centre
Tomo, Joe, District Executive Officer, CCEA

Wakunai

Bure, Gordon, Chairman, Rau COE
Kamai, Simon, Executive Officer, Terra COE
Kopa, Sam, Chairman, Terra COE
Meridith, Bryce, Sq. Leader, PMG
Rerevati, Jacob, A/District Manager
Riki, Peter, Executive Officer, Rau COE

Mabiri

Bro. Ken McDonald

Arawa

Haribos, Kalera, Arawa Restoration
Kukuka, David, Chief, Sirovai
Mattaui, Lawrence, Executive Officer, North Nagovis COE
Meyer, NZVSA, Aropanari STC
Niamis, Augustine, OIC, DPI Arawa
Pippin, John, Liaison Office Manager, OBA
Suinei, Peter, District Manager
Sungai, Peter, District Administration, Arawa
Terry, Fred, UNDP

Sovele

Kailo, Paul, Chairman, Council of Elders
Kesiko, Finance Officer, Bana District
Kasinga, Maria, Villager
Mobiono, Joyceline, Student
Waitapo, Albert, Clerk

Buin

Aisa, Justine, Pariro, Assistant APO
Ampa, Laura, Nakaro Typist
Bana, Joe, Laguai, Farmer
Baubake, Cathy, Laguai Women's leader
Baubake, Martin, Mamaro Air Sankamap Agent
Foster, Andy, Piano, Joint Force Member
Kautua, Thomas, Tabago Farmer
Kebau, John, Mongai Schools Inspector
Kengkua, Francis, Muguai Teacher
Kikinau, Paul, Kanauro Farmer

Kimbure, John, Laguai Farmer
Koiri, Moses, Laguai Radio Operator
Kuitu, Alphonse, Morou, Aid Post Orderly
Lakamai, Paul, Kugiogu Farmer
Lare, Thomas, Piano Reserve Police
Loubai, Stephen, Kanauro Farmer
Mario, Aloysius, Kugumaru Cleaner
Mege, Francis, Kanauro, Farmer
Mege, Stephen, Kanauro, Teacher
Montai, Paul, Porupi Farmer
Nopetau, Joseph, Morou Aid Post Orderly
Nuaku, Kumba, Laguai, Farmer
Parou, Raphael, Kanauro Dental Assistant
Parutana, Simon, Okoiragu Farmer
Pinoko, Stephen, Air Sankamap Agent
Sika, Moses, Morula Farmer
Tooke, Jacob, Mamaro COE
Wape, Francis, Tokaino Teacher
Welai, Tony, Nabaku Farmer

Paruparu Village Training Centre

Bepa, Joseph, Administrative Officer
Bineuni, Herman, Co-ordinator, Village Government
Boran, Simon, Paramount Chief
Borokoi, Thomas, Chief
Chanel, Peter, Farmer, Netupuni
Dekina, Leona, Teacher
Fish, Clement, Carpentry Officer
Hamema, Serominious, Clan Elder
Idioki, Bruno, PEDC OIC Agriculture
Kewaki, Martin, PEDC-H.O.D Maths
Mikua, Charles, PEDC Co-ordinator
Mora, Josephine, Women's Rep.
Nepia, Agnes, PEDC Teacher Training Officer
Pemuko, Alphonse, PEDC Admin.
Tarita, James, BP Congress, CFC
Taverana, Charles, BRA Commander
Tebate, Valentine, Student

Torokina

Br Raphael
Kavia, Kevin, Member, COE
Kerry, Leo, Finance Officer
Meresiri, Vincent, BPC member
Nanatsi, Jmaes, ADO District Office Services
Piriri, Michael, BPC member

Sauiwai, Executive Officer COE
Sio, Markus, Community Development Officer
Taraiti, James, Bougainville People's Congress (BPC) member
Tobaru, Timothy, COE, Bannoni Boboi
Tsiani, John, District Manager

Kunua

Aiyasi, Alex, DPI kunua District Office
Ameria, Aloysius, Community health Worker
Ata, Joseph, OIC Auxilliary Police
Biribata, Andrew, Chief, Kepui Village
Kavira, John, Chief, kepui Village
Matevina, Chief, Ariun Village
Mathew, Chief, Mapisi Village
Naraviri, Timothy, Chief, Koatovoi Village
Pana, Theresa, Typist, District Office
Pitapiri, Chief, Kepui Village
Ririboir, Lawrence, H/teacher, Elementary School
Saratoro, Aloysius, Chief, Kopaei Village
Siakere, Herman, Chairman, Health Board
Siia, Simeon, Project Officer, School Board
Siopi, Chief, Toseavi, Village
Sisiesi, John, district Manager, Kunua
Tore, Jonathan, Commander, Resistance Unit
Toveas, Amos, Chief, Koatava Village

Appendix 4. CCEA Records

PNG COCOA & COCONUT EXTENSION AGENCY

(A Subsidiary of Cocoa Board and Copra Marketing Board of Papua New Guinea

P O Box 250, Buka Bougainville Province, Papua New Guinea

Telephone (675) 973 9717 Facsimile 973 9717

COCOA REHABILITATION ON BOUGAINVILLE

After the multi agency meeting on Cocoa replanting (April 1998) UNDP injected KSO,000 for Hybrid Cocoa seeds purchase.

1. SEED DISTRIBUTION

With in the remaining 10 months 1998 CCEA distributed a total of (385,270) hybrid cocoa seeds between nine (9) districts excluding Atolls, Wakunai and Nissan which were accommodated by Provincial DPI.

2. DISTRICTS BREAKUP

2.1 Siwai	180,300
2.2 Buka '	104@400
2.3 Tinputz	25,740
2.4 Torokina	23,120
2.5 Nagovisi	19,600
2.6 Soroken	11,000
2.7 Buin	9,400
2.8 Selau/Suir	6,700
2.9 Kieta	5,000

TOTAL - 385,270

Mr MATTHEW H UREMU,
PROVINCIAL EXTENSION MANAGER

PNG COCOA & COCONUT EXTENSION AGENCY

(A Subsidiary of Cocoa Board and Copra Marketing Board of Papua New Guinea)

P O Box 250, BUKA Bougainville, PNG

Telephone (675) 9839717: Facsimile: (675) 9839717

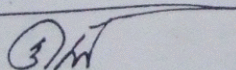
COCOA REHABILITATION BOUGAINVILLE

1. DISTRIBUTION OF 1999 COCOA SEEDS
2. SEED DISTRIBUTION

Within seven months of 1999 CCEA distributed a total of (247,390) hybrid cocoa seeds between ten (10) districts excluding Nissan and Atolls.

3. DISTRICTS BREAK UP

3.1	SIWAI	48,250
3.2	BUKA	49,050
3.3	SELAU/SIUR	31,300
3.4	TINPUTZ	18,650
3.5	SOROKEN	19,300
3.6	WAKUNAI	9,900
3.7	KIETA	24,700
3.8	NAGOVISI	2,100
3.9	BUIN	42,840
3.10	TOROKINA	1,600
	TOTAL	247,390


MATHEW UREMU
Provincial Extension Manager

PNG COCOA AND COCONUT EXTENSION AGENCY

(A Subsidiary of Cocoa Board and Copra Marketing Board of Papua New Guinea)

P.O. Box 250, Buka, Bougainville, PNG. Phone/Fax 973 9717

PROVINCE:.....BOUGAINVILLE
MANAGER:.....MR MATHEW H UREMU
MONTH:.....APRIL
YEAR:.....1998

MONTHLY PROJECT IMPLEMENTATION REPORT

COCOA REHABILITATION PROGRAMME

PNGCCEA PROJECT

MAIN OBJECTIVES: UNDP FUNDED HYBRID COCOA SEEDS

1. THE EXISTING BLOCKS
2. INCREASE PRODUCTION

PHYSICAL IMPLEMENTATION	PROJECT INDICATION	GROWER	DISTRICT	VILLAGE	TOTAL SUPPLIED	TOTAL
1. Distribution of seeds	No of seeds delivered	PETER KUHLE	SINAI	KORORO	2500	2500
2. Seedlings Field Planted	No of seedlings Field Planted	A. KANAMARE	"	KARA	3700	3700
		PAUL TANSI	"	KUTINAI	2000	2000
		SIMON SOAI	"	PANAKI	2000	2000
		MURRAY KUIKA	"	KOHKUI	1700	1700
		SIKUNT JOMU	"	"	2000	2000
		JOHN KIKORU	"	KUISEI	1700	1700
		KEDOMA	"	MUSIN	2000	2000
		TOKURA	"	KUNNU	2000	2000
		MELI	"	KUNNU	2000	2000
		PETER KUIKA	"	KURAI	2500	2500
		P. KANAMARE	"	PANAKI	3000	3000
		A. KUISEI	"	MUSIN	4000	4000
		PETER KUIKA	"	MUSIN	3000	3000
TOTAL SEEDS DELIVERED					28000	28000
TOTAL SEEDS FIELD PLANTED						

(A Subsidiary of Cocoa Board and Copra Marketing Board of Papua New Guinea)

P O Box 250, BUKA Bougainville, PNG

Telephone (675) 9839717; Facsimile: (675) 9839717

PROVINCE: ...BOUGAINVILLE...
MANAGER: ...MATHEW UREMU
MONTH: ...June...
YEAR: ...1991... 1998

MONTHLY PROJECT IMPLEMENTATION REPORT

COCOA REHABILITATION PROGRAMME

PNG CCEA PROJECT:

MAIN OBJECTIVES:

1. THE PLANT EXISTING BLOCKS
2. INCREASE PRODUCTION

PHYSICAL IMPLEMENTATION	PROJECT INDICATION	BUKA	SELAU/SUIR	TINPUTZ	SOROKEN	WAKUNAI	KIETA	NAGOVISI	SIWAI	BUII	TOROKINA	NISSAN	ATOLLS	TOTAL
1. DISTRIBUTION OF SEEDS	NO OF SEEDS DELIVERED			1,000				7,000	4,000	8,000				20,000
2. SEEDLING FIELD PLANTED	NO OF SEEDLINGS PLANTED			14,000	4,000				28,000	4,000				50,000
	TOTAL SEEDS DELIVERED			1,000				7,000	4,000					20,000
	TOTAL SEEDLINGS FIELD PLANTED			14,000	4,000				28,000	4,000				50,000

Appendix 5 Duty Statements

A5.1 Co-ordinator

The co-ordinator shall:

- Advise the Department of Bougainville and the Bougainville Provincial Government on the overall agricultural package for the province.
- Advise and liaise closely with the Division of Agriculture on Bougainville and ensure that all agricultural interventions in the province are linked into that division.
- He will be responsible for regular reporting and arranging meetings between all agencies (including aid agencies, government, statutory bodies and NGOs) engaged in any aspect of agricultural rehabilitation on Bougainville.
- He will assist the Department of Bougainville in the allocation of various tasks to each agency and be responsible for ensuring that there is no overlap or duplication between agencies.
- Ensure that cocoa and coconut planting material is available to farmers in the selected districts.
- Assist the Department of Bougainville in integrating this programme into their annual budgets and any longer term planning process to ensure that adequate maintenance and upkeep funds will be available to make the project sustainable.
- Oversight the implementation of the EU rehabilitation package and any other agricultural interventions that might be considered.
- Ensure that implementing agencies report regularly and accurately to him and the Department of Bougainville.
- Carry out regular physical project inspections and arrange for appropriate technical assistance where necessary.
- Maintain accounts and other records as required.

A5.2 Accounts Clerk

- Maintain records of all payments to and by the PMU. Ensure that all payments are adequately documented.
- Ensure that agricultural suppliers are providing the best prices available and that all payments are for the delivery of materials and supplies.
- Maintain office records and inventories, accounts and any other clerical duties that may be required.
- Other duties as required by the co-ordinator.

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ERRATA

1. Delete 7.14 which has been moved to the recommendation section of the report.
2. Insert new 10.5 Integration
3. 10.6 becomes Project Management Unit.

PACONSULT

17 November 1999
Our File: Bougainville

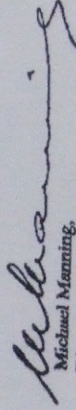
Chairperson,
Steier Steering Committee,
Department of Treasury and Planning,
PO Box 631,
Waigani, NCD

Re: Bougainville Rehabilitation Report

I has come to my attention that there are a number of errors in the Contents page of our report. Could you please circulate the attached errata page which will amend most of the problems.

I note that we have omitted the terms of reference proposed by the EU Technical advisor and there is little we can do about that now as the report has been released. This is not altogether bad because these caused quite a lot of confusion in the draft report. All members have these TOR in the draft report if they wish to refer to them.

With Regards


Michael Manning,
Director

Cc Mr Sorgenicht 3250098